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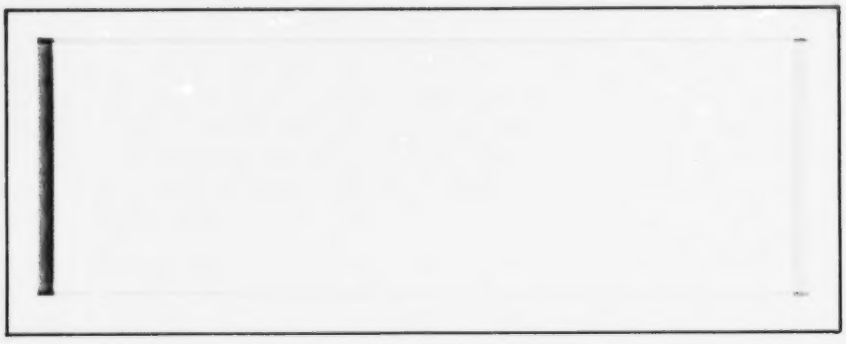

WORKING PAPER

Policy Branch

Direction générale des politiques

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SEASONAL PRICE AND MARKETING VARIATIONS IN THE LIVESTOCK INDUSTRY

(Working Paper 17/86)

M. Tan Yap

Commodity Markets Analysis Division
Policy Branch
Agriculture Canada

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Comments on this study may be sent to the author, Agriculture Canada, Room 625, Sir John Carling Building, Ottawa, Ontario, K1A 0C5 (613) 995-5880.

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1.0 INTRODUCTION

Livestock prices and marketings fluctuate considerably, and these fluctuations can create uncertainty within the livestock sector. These variations can be important and an understanding of their nature and causes is helpful to analysts involved directly or indirectly with the industry.

With few exceptions, slaughter prices for livestock in North America have followed a seasonal price pattern within the year; prices normally advance from the winter into the early summer period and then decline into the fall. In 1985 however, a significant deviation from the historical seasonal price pattern was exhibited with counterseasonal summer declines, especially for fed cattle, i.e., slaughter steers and heifers. This sharp drop in the fed cattle prices could be accounted for partly by the increased beef production during the 1985 summer period due to heavier carcass weights and large North American meat supplies.

A question is whether this 1985 occurrence could be the beginning of a new seasonal pattern or the result of some sporadic motions resulting from chance events. In any case, the 1985 experience demonstrates that variation in any data series is the result of a number of influences impinging on the market place. Some of these factors are regular seasonal ones, some result from relationships to other variables and some result from "inertia" in the variable itself. The point is that often regular movements, such as seasonal movements, can be explained by other factors operating in the market place. From an industry analysis perspective, it is important to analyse regular factors causing movements in a particular series, to examine how these may dominate such movements, and to gauge whether "irregular" movements supercede these regular ones.

It is in this context that the current report is directed. This paper concentrates on an examination of the seasonal component of variation in the livestock prices and marketings of cattle, hogs, lambs and chicken. It attempts to identify seasonal patterns and the changes in these observed over the years from 1970 to 1985. A brief attempt will be made to explain the

possible reasons for observed seasonal patterns and any shift that could have occurred, but the primary focus is on the descriptive aspects of seasonality rather than its causes.

It should be noted that livestock prices in Canada are closely related to the corresponding prices in the United States. Since the United States market is many times larger than that of Canada, the United States is the dominant partner in this relationship. The sensitivity of the United States prices to Canadian production factors is so small as to be negligible that it justifies the conclusion that Canadian livestock prices are determined by the United States livestock prices. Against this background, an interesting issue is whether the seasonality of the Canadian price and marketing series is similar to those in the United States.

This report is divided into seven sections. Section 2 outlines a definition of seasonality and the procedure involved in estimating the indices. Sections 3 through 6 describe the seasonality patterns and changes that may have occurred over the years for each of the four livestock commodities, cattle, hogs, lambs and chickens. In section 7 conclusions are offered with respect to the relative degree of seasonal variability among the livestock commodities.

2.0 SEASONALITY

Seasonality refers to the periodic movements in a data series that occur within each successive twelve-month period. It can remain substantially the same from year to year or it can exhibit changing patterns over time. Recurring annual events are the cause of seasonality, the stability of which depends upon the constancy of such events.

2.1 Seasonality in Livestock Prices and Marketings

Livestock prices and marketings very often follow a definite pattern within the year. There are certain months in which the prices or marketings are typically at higher or lower levels than in other months. These movements exhibit similar patterns during corresponding months of successive years.

Changes in livestock marketings are generally directly affected by seasonal factors, among which include variations in the climatic conditions, seasonality in feed supplies as well as the biological characteristics of the process of production. This irregular flow of animals to the market during the year has a direct bearing on the seasonal annual movements in prices. It must, however, be noted that other events also play a role in affecting the seasonal price variations. Such events include consumer preferences and demand for all meat or for one type over another, the slaughter of livestock as well as the general price level of all commodities.

2.2 Methodology

The seasonal component of variation in the supplies and prices of livestock can be measured by means of seasonal indices. These indices were computed on a quarterly basis from 1970 to 1985 for price and marketing time series data.[1] These data were extracted from the Meat Trade and Livestock Report published by Agriculture Canada. The method used for this computation was the United States Bureau of Census method of seasonal adjustments.[2] The seasonal index value, called the seasonal factor for each quarter, reflects the normal price or marketing for that quarter as a percentage of a transformation of the original series in which the seasonality component has been removed (called the "seasonally adjusted series").[3] An index value exceeding 100 indicates seasonally high prices or marketings (e.g. a value of 105 would mean that the seasonal component is 5% higher than "normal"). Likewise, values less than 100 reflect seasonally low prices or marketings. A value of 100 indicates that a particular quarter has no seasonal factor compared to the series with all seasonality removed.

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1 Seasonal factors could also be computed on a weekly or monthly basis. However, a quarterly time frame was chosen since it corresponds to Agriculture Canada's outlook time frame.

2 Shiskin, Julius, Allen H. Young and John C. Musgrave. The X-11 Variant of the Census Method II Seasonal Adjustment Program. Tech. Papers #15, Bureau of the Census, U.S. Dept. Of Commerce, Revised February 1967.

3 The "multiplicative" seasonal adjustment program was utilized for this report. Statistical results showing the stability of seasonality are provided in Appendix II.

3.0 BEEF CATTLE

The seasonal factors for prices and marketings for the various types of cattle were compared over four time periods, 1970-74, 1975-79, 1980-84 and 1985, to observe how the seasonal pattern has changed over the last sixteen years. The types of cattle covered are feeder calves, fed cattle in Canada and the United States, cows and bulls and a combination of fed cattle, cows and bulls.

3.1.1 Feeder Cattle Prices

The seasonal price indices of the 500-600 pounds feeder steer at the Calgary market are charted in Figure 1. The index values range from a low of about 2% to 5% below the seasonally adjusted value to a high of about 1% to 4% above it. The prices are at the lowest level in the third quarter and peak in the second quarter. Quarterly variation has been fairly consistent over time; the exception being 1975-79 when the seasonal factor dropped to 95.2% or 4.8% below the seasonally adjusted value while the peak exceeded it by 3.5% giving a spread of 8.3%. Otherwise this variation fluctuates around the 4.2% to 5.0% level. In terms of the seasonal peaks and lows, feeder steer prices were highest in the fourth quarter and lowest in the first quarter during 1970-74. Between 1975-79 the seasonal peak occurred in the second quarter while the seasonal low was experienced in the third quarter. This seasonal trough experienced in the third quarter persisted through to 1985; however, the seasonal high shifted from the second quarter to the last quarter in 1980-84 and back to the second quarter in 1985. It is difficult to explain this seasonal pattern in prices, but one explanation would be that these prices follow the seasonal pattern of finished cattle, lagged appropriately to reflect feeding time. This follows from the theory that feeder prices are derived from expected finished prices.[4] As noted below, the seasonal peak in finished prices is experienced in the second quarter.

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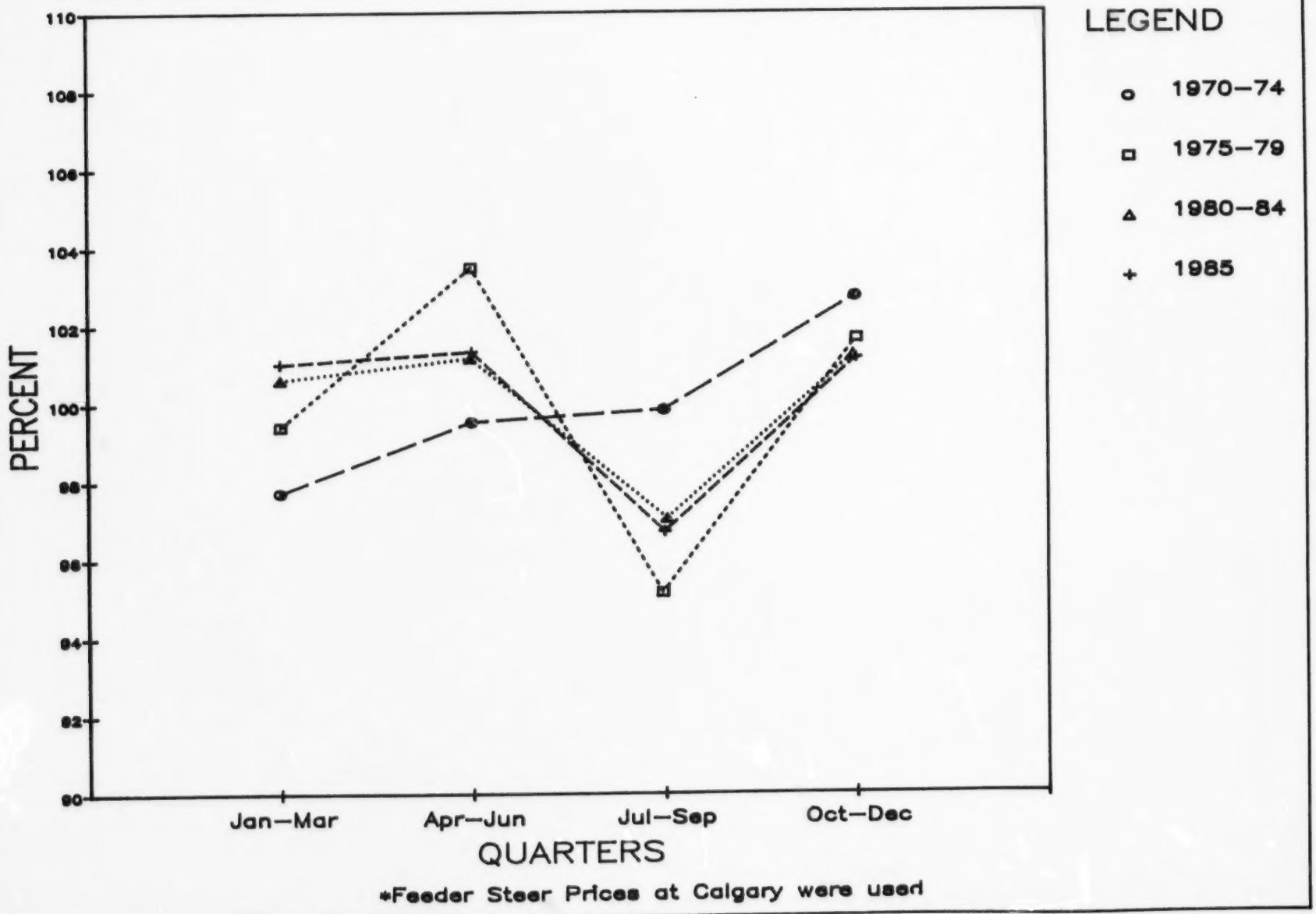
[4] The per cwt value of a feeder animal is equal to its anticipated per cwt value as a finished animal plus (or minus) the anticipated net revenue gain (or loss) during the feeding period of purchase weight.

FIGURE 1. SEASONALITY IN CANADIAN FEEDER STEER PRICES*



*Feeder Steer Prices at Calgary were used

3.1.2 Slaughter Steer Prices

The general seasonal price patterns for A1A2 slaughter steers on the Toronto market are represented in Figure 2. It was observed that in the 1970-74 period prices reflected very little variability on a seasonal basis; prices at the seasonal low in the fourth quarter were less than 2% below the seasonally adjusted series while the seasonal high in the third quarter exceeded the seasonal average by only 0.9% resulting in a seasonal spread of 2.2%. In 1975-79 the seasonal span increased to 4.4% with a seasonal peak of 102.1% in the second quarter and a seasonal low of 97.7% in the first quarter. In 1980-84 prices reflected a low seasonal factor of 97.4% in the last quarter and a peak value of 103.5% in the fourth quarter giving a seasonal spread of 6.1%. The seasonal span increased to 6.7% in 1985 reflecting a seasonal peak of 104.1% in the second quarter and a low of 97.5% in the third quarter.

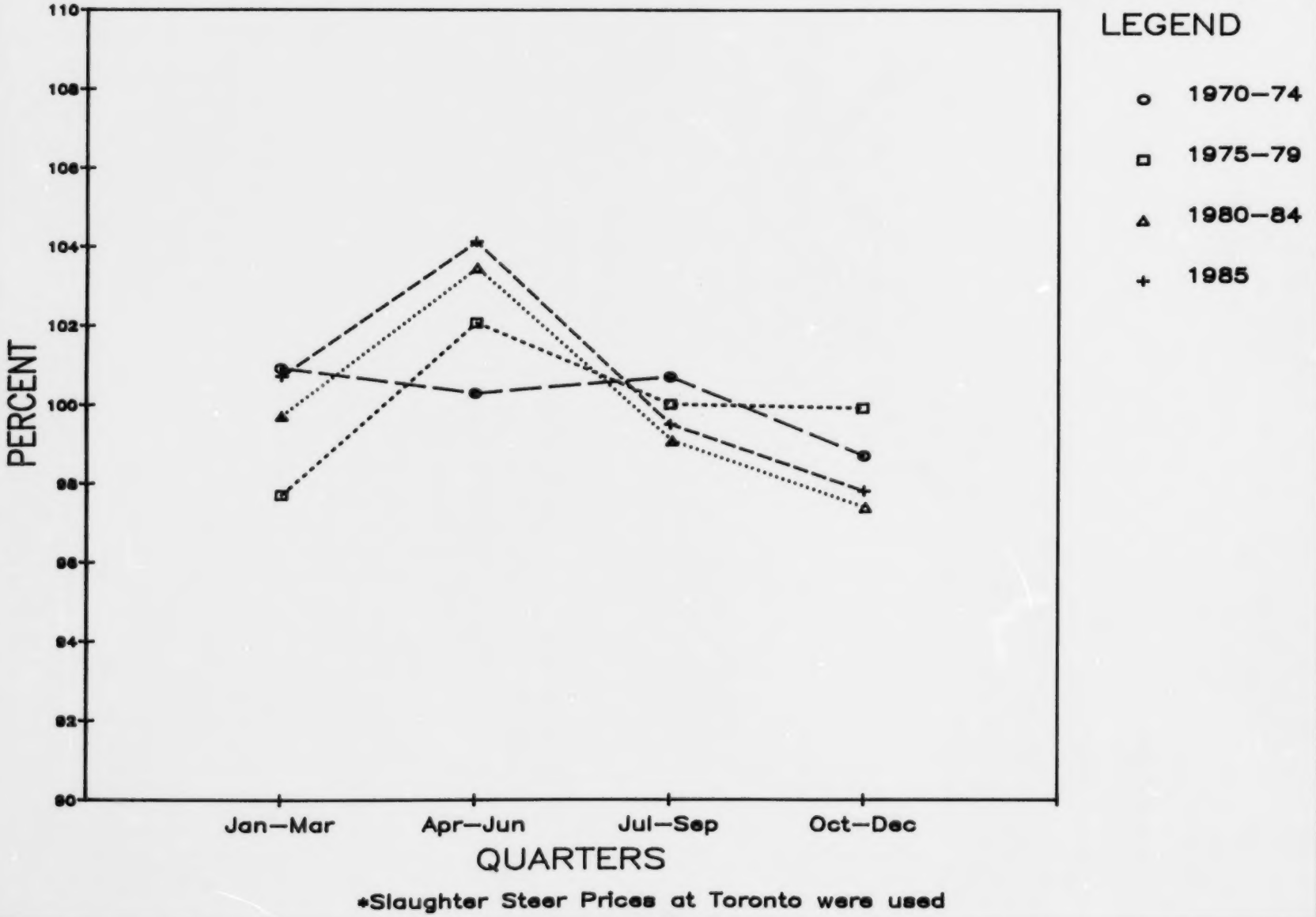
Figure 3 illustrates the seasonal patterns in the United States choice steer prices at Omaha. The 1970-74 seasonal pattern reflects a seasonal peak (102.8%) in the third quarter followed by a seasonal trough (94.3%) in the fourth quarter. This pattern shifted in the 1975-79 period; the choice steer prices were at the minimum seasonal level (96.8%) in the fourth quarter and at the peak (105.4%) in the second quarter. The pattern persisted through 1985 with seasonal factors ranging from 96.8% to 103.9%.

The United States choice steer prices at Omaha were seasonally more variable than the Canadian A1A2 steer prices. The seasonal spread of the former series was calculated at 8.5% in 1970-74, 8.6% in 1975-79, rose to 9.3% in 1980-84 before falling to 7.1% in 1985. These values averaged twice as high as that of the Canadian prices.

3.1.3 Slaughter Cow Prices

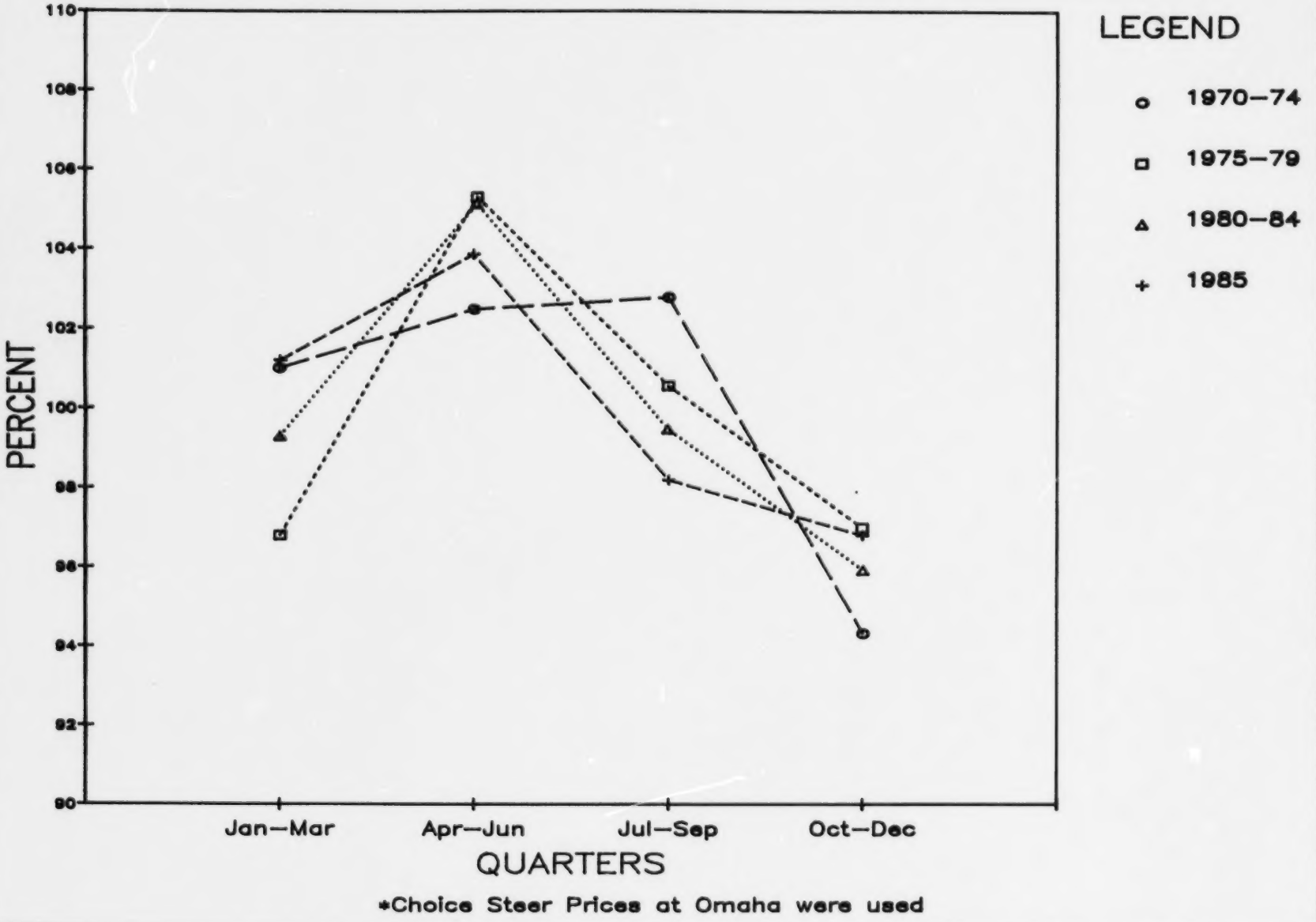
During the period 1970-74 D1D2 cow prices on the Toronto market were at their seasonal high level of 105.1% in the second quarter while at their lowest of 92.7% in the last quarter. This pattern persisted for the complete time periods 1970-1985. The seasonal peak values were 107.1%, 103.8% and 105.3% for 1975-79, 1980-84, and 1985 respectively. Their respective seasonal lows were 91.9%, 92.9%, and 91.7%. In terms of seasonal variability among the

FIGURE 2. SEASONALITY IN CANADIAN SLAUGHTER STEER PRICES*



*Slaughter Steer Prices at Toronto were used

FIGURE 3. SEASONALITY IN US SLAUGHTER STEER PRICES*



*Choice Steer Prices at Omaha were used

periods the spread fluctuated between 12.4% during 1970-74 and 15.2% in 1975-79. Thereafter, it dropped to 10.9% in 1980-84. However, in 1985 the seasonal span increased to 13.6%. (See Figure 4.)

3.2.1 Beef Cattle Marketings

The seasonality in the marketing of steers and heifers, cows and bulls, and a combination of these two groups was examined for Canada and the United States. However, no analysis was done on the marketings of feeder steers due to the unavailability of data. Canadian marketings as used in this report refers to total number of animals slaughtered plus the net trade of live animals (exports less the imports).

3.2.2 Steer and Heifer Marketings

The marketing patterns of slaughter steers and heifers in Canada, as shown in Figure 5, exhibit more seasonal variability than do prices. Marketings at the seasonal minimum level were about 5% to 7% below the seasonally adjusted levels. The seasonal low values increased from 93.0% in 1970-74 to 94.9% in 1975-79 and declined to 94% in 1985. These patterns occurred consistently in the fourth quarter of the four five-year periods examined. The indices increase in the first quarter and peak in the third quarter at a level of about 3% to 7% above the seasonally adjusted value. The peak seasonal factors for marketings have declined from 106.4% in 1970-74 to 103.3% in 1975-79; in the 1980's they increased steadily to 105.0% in 1980-84 and 106.2% in 1985. The general overall seasonal pattern did not change over each period, but, the span of variability fluctuated between 8% and 13%. The span was 13.4% in 1970-74, 8.4% in 1975-79, 10.1% in 1980-84, and 12.2% in 1985.

3.2.3 Cow and Bull Marketings

Figure 6 charts the seasonality patterns in the marketings of cows and bulls. Seasonal high marketings occur consistently in the last quarter in all the four periods studied. The seasonal factors for peak marketings increase from 117.1% in 1970-74 to 128.7% in 1975-79, then decline to 118.9% in 1980-84, and to 114.8% in 1985. Seasonal low marketings occur in the second quarter in 1970-74 and 1975-79 but shift to the third quarter in the 1980's. In relation

FIGURE 4. SEASONALITY IN CANADIAN SLAUGHTER COW PRICES

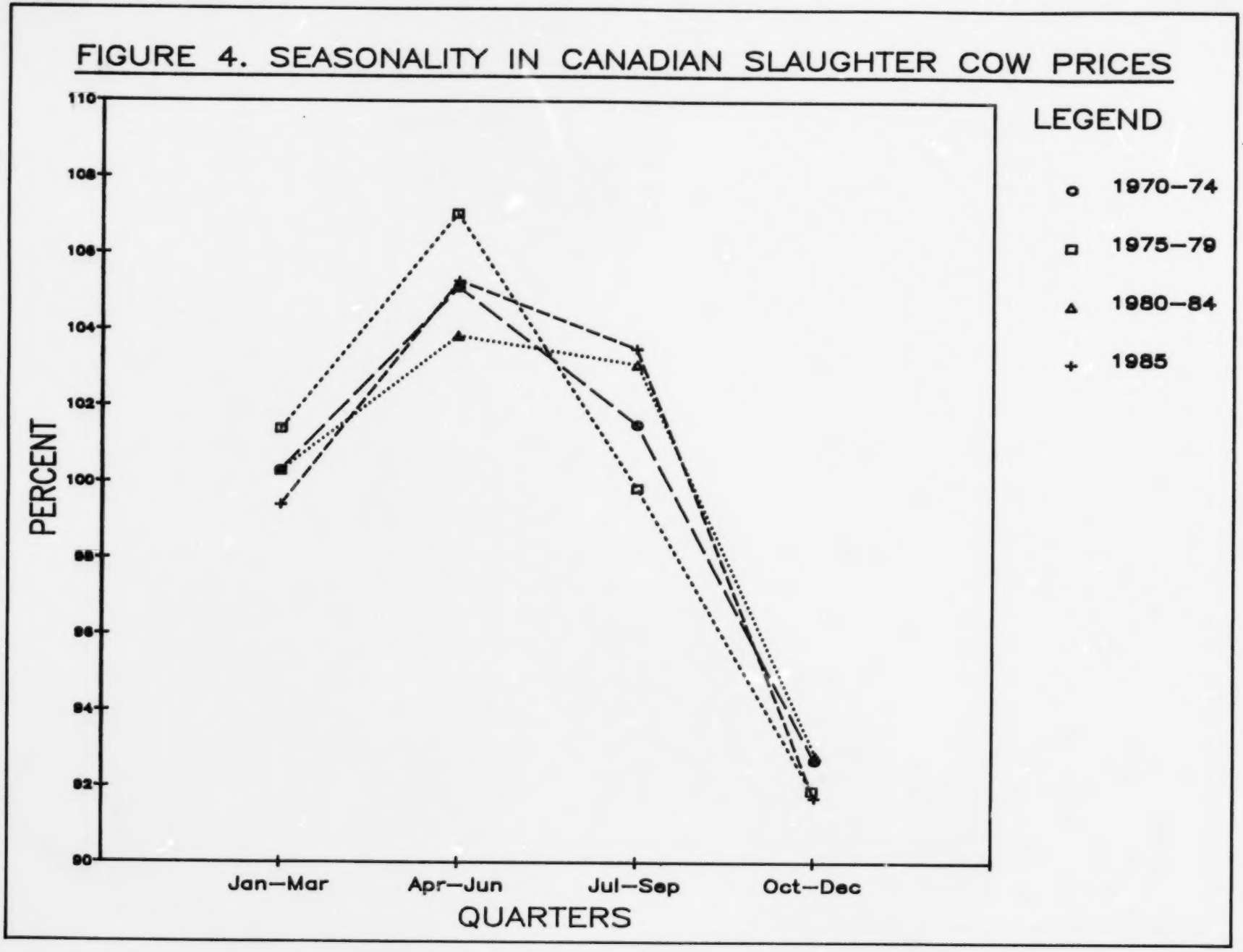
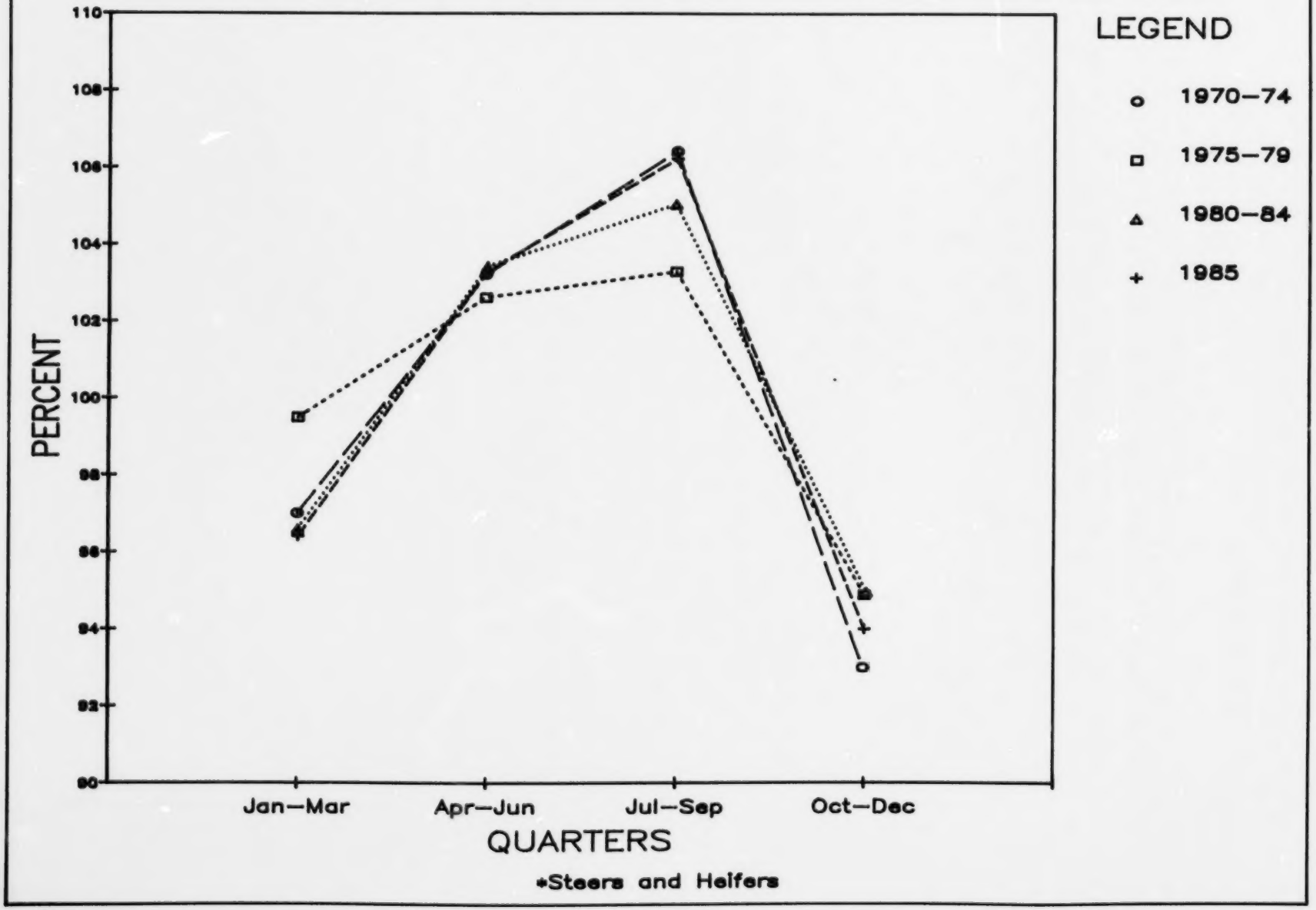
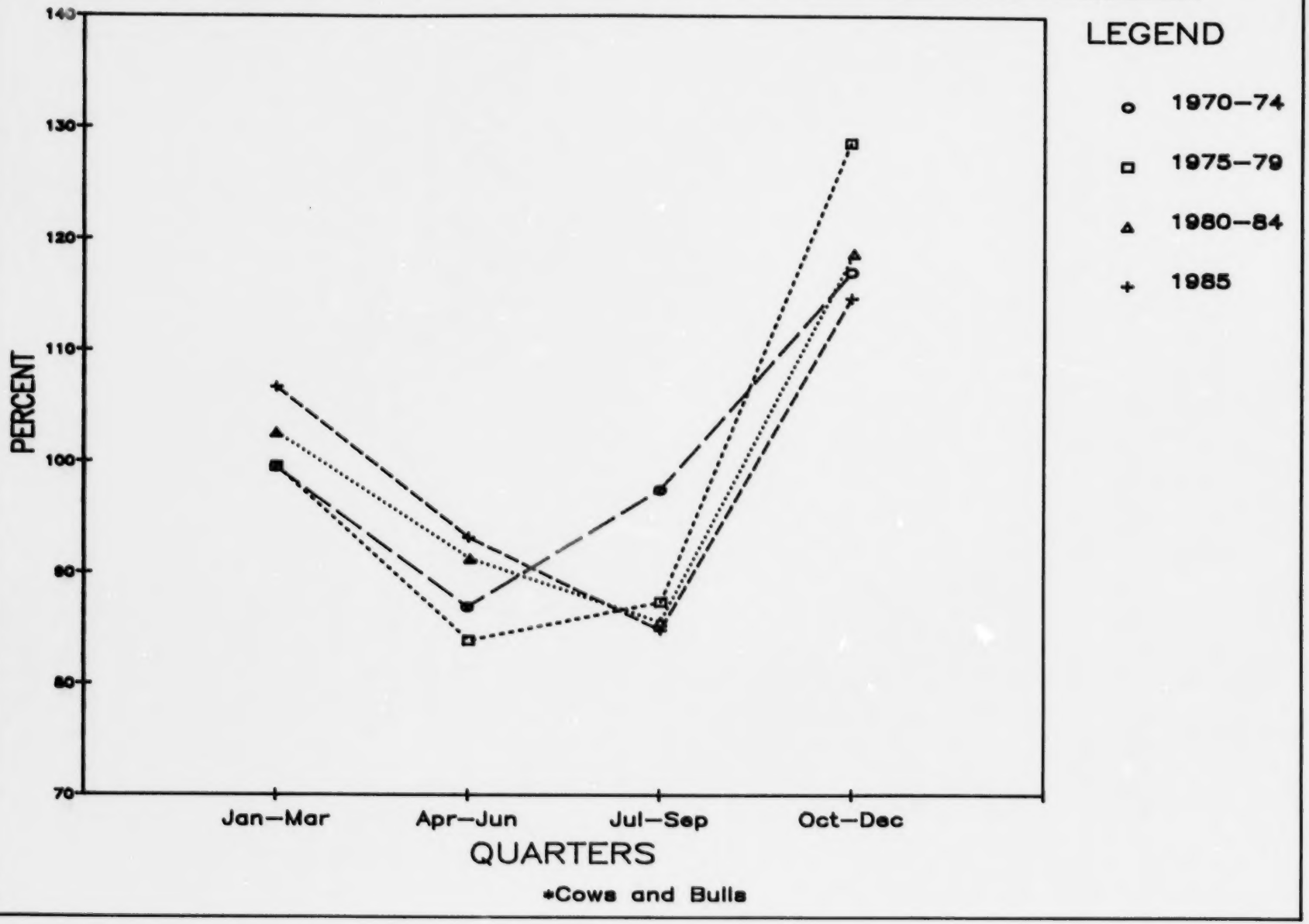


FIGURE 5. SEASONALITY IN CANADIAN CATTLE MARKETINGS*



*Steers and Heifers

FIGURE 6. SEASONALITY IN CANADIAN CATTLE MARKETINGS*



*Cows and Bulls

to periods of peak and low movements within the year, the span of seasonal variation in marketings of cows and bulls increased substantially from 30.2% in 1970-74 to 44.9% in 1975-79. During the 1980's the span declined from 33.3% in 1980-84 to 29.9% in 1985.

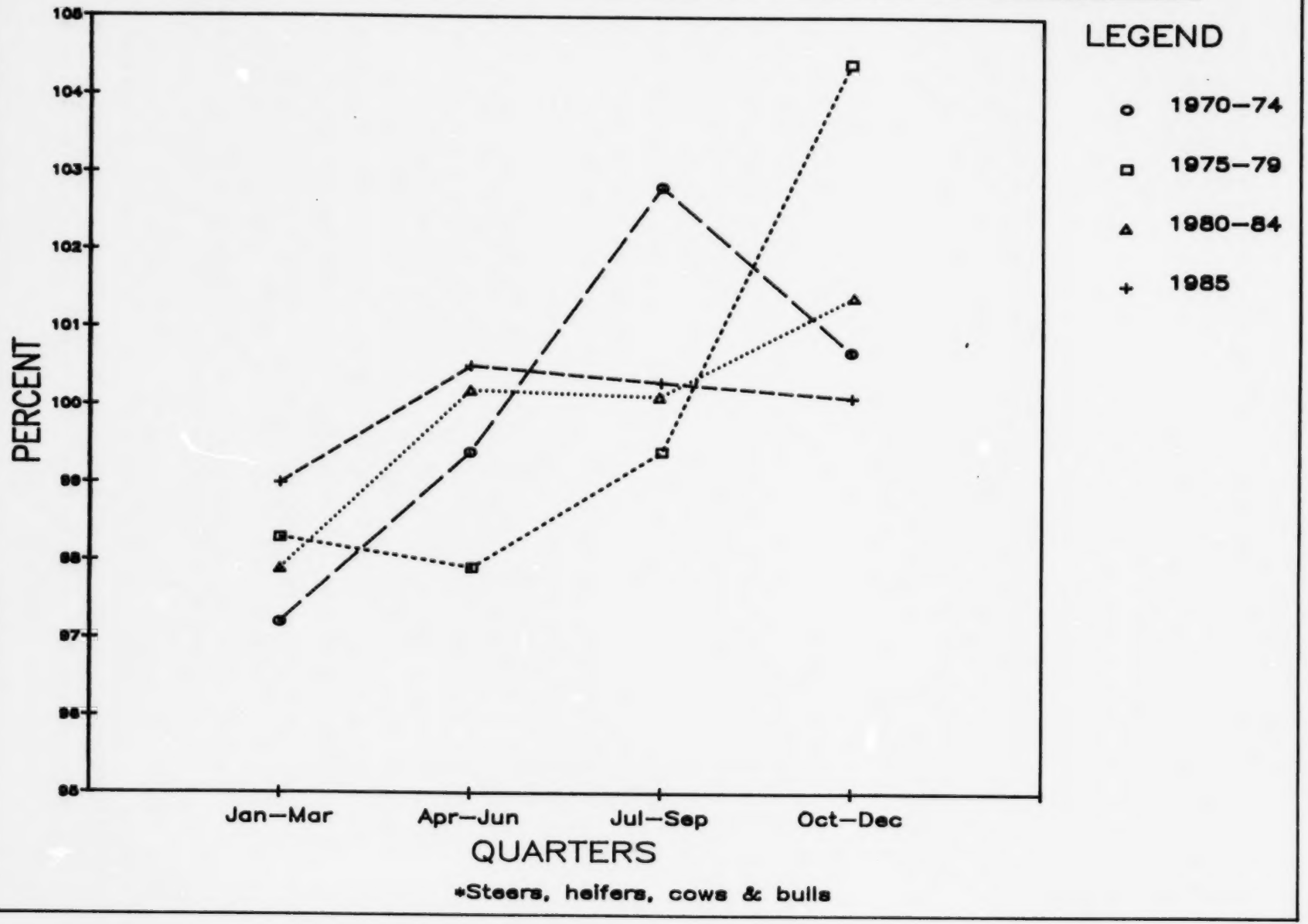
3.2.4 Total Cattle Marketings

Total cattle marketings of slaughter steers, heifers, cows and bulls demonstrated varying seasonal patterns over the years. During the period, 1970-74, total cattle marketings were at their seasonal low point during the first quarter, and increased to their maximum level in the third quarter. However, during the period, 1975-79, marketings fell below the seasonally adjusted value in the first quarter, continued to fall to a minimum level in the second quarter, and then increased in the third and fourth quarters. In these two periods (i.e. 1970-74 and 1975-79) wide seasonal swings were observed. Beginning in the early 1980's cattle marketings have become relatively consistent. The variability in seasonal marketings decreased in magnitude from more than 6% in the seventies to about 2% in 1985. However, in the period, 1980-85 peak marketings continued to occur in the fourth quarter with minimum marketings in the first quarter and seasonal average marketings between the second and third quarters. The seasonality patterns are illustrated in Figure 7.

The seasonal patterns of cattle marketings in the United States illustrated in Figure 8, show that cattle marketings rise above the seasonal average during the later half while they fall below the seasonal average during the first half of the year in all the sixteen years examined. Seasonal marketings peaked in the fourth quarter during the 1970s but the peak switched to the third quarter in the 1980s. Seasonal peak factors were between 2% and 3% above the seasonal average. Marketings declined to their seasonal minimum in the first quarter during 1970-74; the minimum changed to the second quarter in 1975-79 and 1980-85, but reverted back to the first quarter in 1985. Seasonal low values averaged 2.5% below the seasonal average.

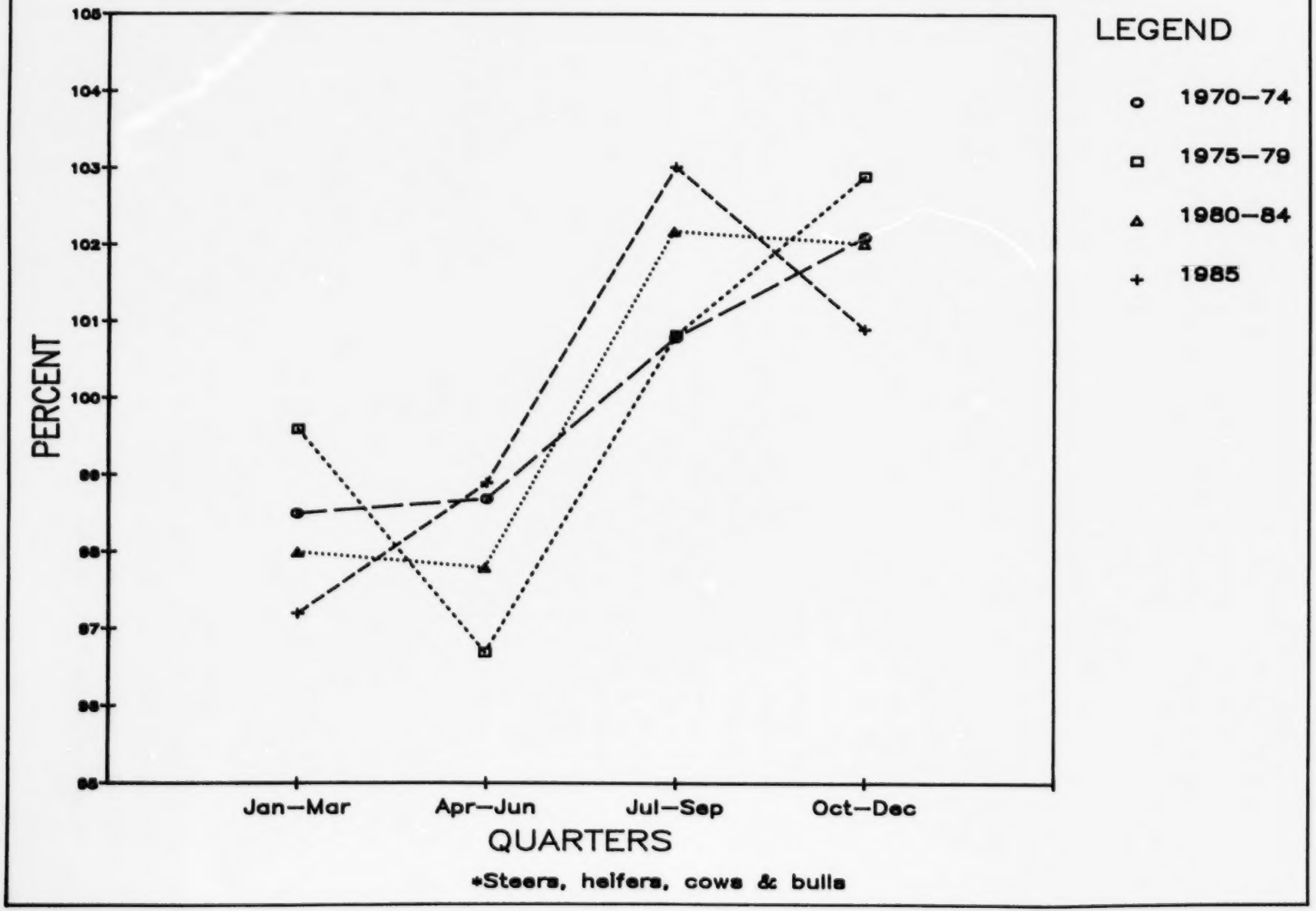
Over the complete time period the range of high and low marketings averaged about 5%. The seasonal span of 3.6% calculated in 1970-74 increased to 6.2% in 1975-79, declined to 4.4% in 1980-84 and then increased to 5.8% in 1985.

FIGURE 7. SEASONALITY IN CANADIAN CATTLE MARKETINGS*



*Steers, heifers, cows & bulls

FIGURE 8. SEASONALITY IN U.S. CATTLE MARKETINGS*



*Steers, heifers, cows & bulls

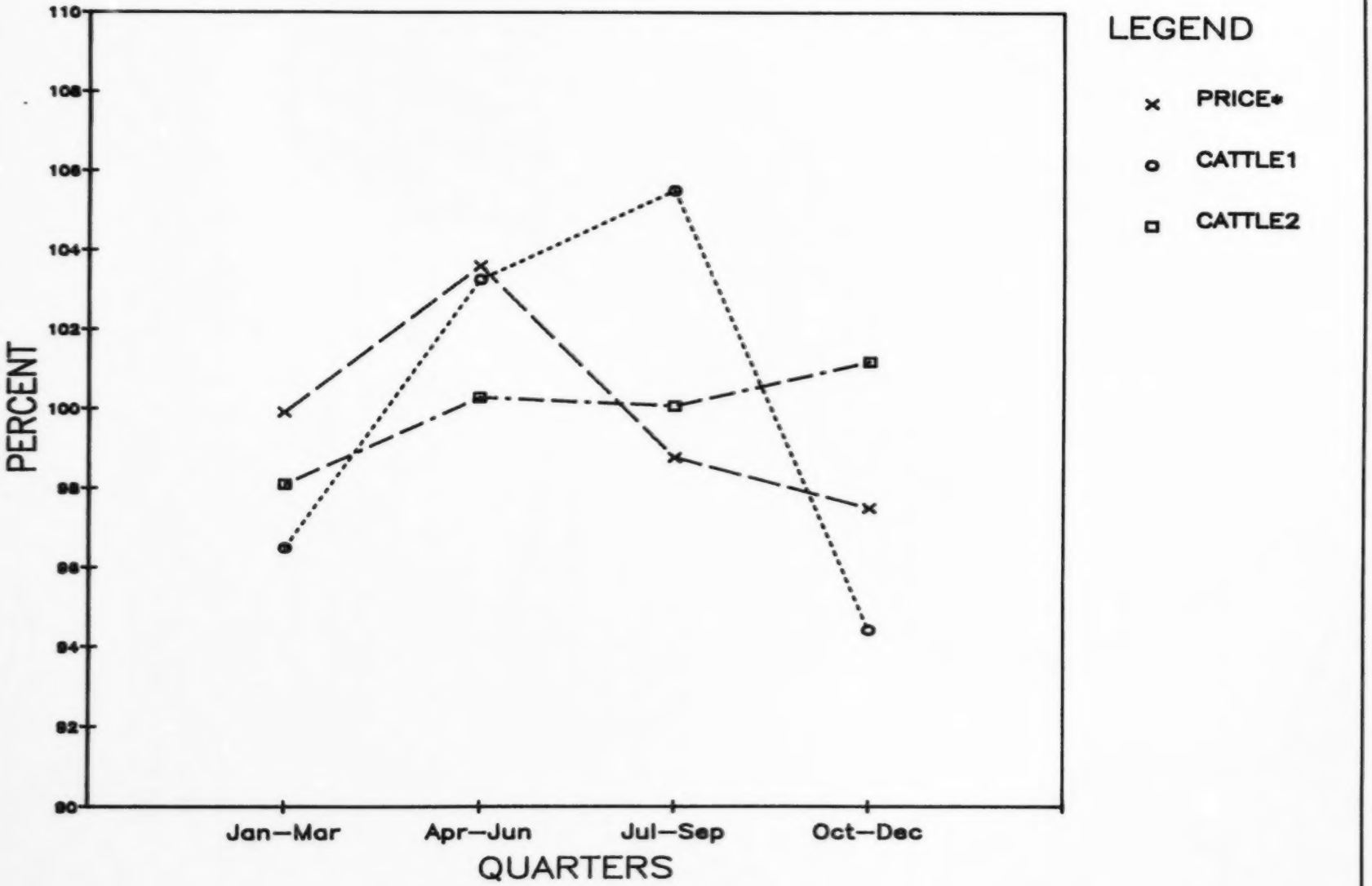
Generally, the seasonal marketing patterns in both Canada and the US were similar. However, it was observed that marketings in the United States display a greater intensity in seasonal variation relative to the Canadian marketings.

3.3 General Observations

Figure 9 shows the seasonality in slaughter steer prices in relation to the seasonality in steer and heifer marketings and all cattle marketings. It can be observed that slaughter steer prices were inversely related to the slaughter steer and heifer marketings. When slaughter steer prices were high, slaughter steer and heifer marketings were low, and vice versa. The seasonality pattern in the marketings can be traced directly to the breeding and feeding practices in the beef cattle industry. The length of the feeding period determines when the animals are brought into the market. The seasonal pattern illustrates that steers and heifers are typically placed in feedlots (or in backgrounding operations) during the fall following weaning and fed for about six to ten months, thus resulting in peak marketings during the summer months. Variability in marketings appeared to be stabilized when total cattle marketings are considered. It is interesting to note that during the months of low steer and heifer marketings, the supply of cows and bulls more than make up for the former, hence the presence of an almost constant flow of animals to the market.

Fed cattle (steers and heifers) produce high quality beef and beef products, the demand for which is greatest during the summer months, while cows and bulls are sold when they are culled which occurs in the fall. The latter animals are considered low quality meat producers, the supply of which tends to stabilize the overall seasonal supply of beef. It appears that the marketing pattern is not the only factor responsible for the appearance of change in the seasonal price patterns. There is some evidence of a seasonal meat demand which is influenced by climatic conditions in such a way that there is a higher preference for certain meats and meat cuts in some seasons of the year than others. Since beef lends itself more readily to summer cooking than pork, the seasonal difference in the demand for beef may partially explain the seasonal peak prices in the third quarter and relatively low prices in the first quarter.

FIGURE 9. SEASONALITY IN CANADIAN CATTLE PRICES AND MARKETINGS, 1980–85



*Toronto Prices 1Steers & Heifers 2Steers, Heifers, Cows & Bulls

4.0 HOG PRICES

The seasonality in the prices of Index 100 hogs at Toronto is illustrated in Figure 10. During 1970-74 hog prices rose above seasonally adjusted values in the first, third and last quarters and fell below the seasonal average in the second quarter. During the period, 1975-79, prices were above the seasonal average for only two quarters, the third and fourth; in 1980-84 and 1985 only the third quarter exhibited above seasonal average prices.

In all the 16 years under observation, seasonal high prices were established consistently during the third quarter. However, the lows occurred in the second quarter during 1970-74 right up to 1980-84. In 1985, however, the seasonal low shifted to the fourth quarter. The seasonal highs declined in all the years examined; from 106.2% in 1970-74 to 105.9% in 1975-79 and 1980-85 then to 104.7% in 1985. On the other hand the seasonal lows improved steadily over the years from 92.45% in 1970-74 to 95.8% in 1975-79 to 96.7% and 97.5% in 1980-84 and 1985 respectively.

In terms of variation, it was observed that over the years price variations have declined substantially between the periods 1970-74 and 1985, from 13.4% to 7.2% respectively. This reflects improved buildings and other facilities especially in swine farrowing operations and a more year round supply of feeder pigs for feeding to market weights. Also, the demand for pork is more evenly distributed throughout the year.[5]

The seasonal movements in the US 7-markets price (average hog prices on the seven markets in the United States) charted in Figure 11, indicate that the seasonal patterns of the American hog price series are similar to the Canadian counterparts in certain respects. Prices are at a seasonal peak at the same time, i.e., in the third quarter. But they differ in the timing of the

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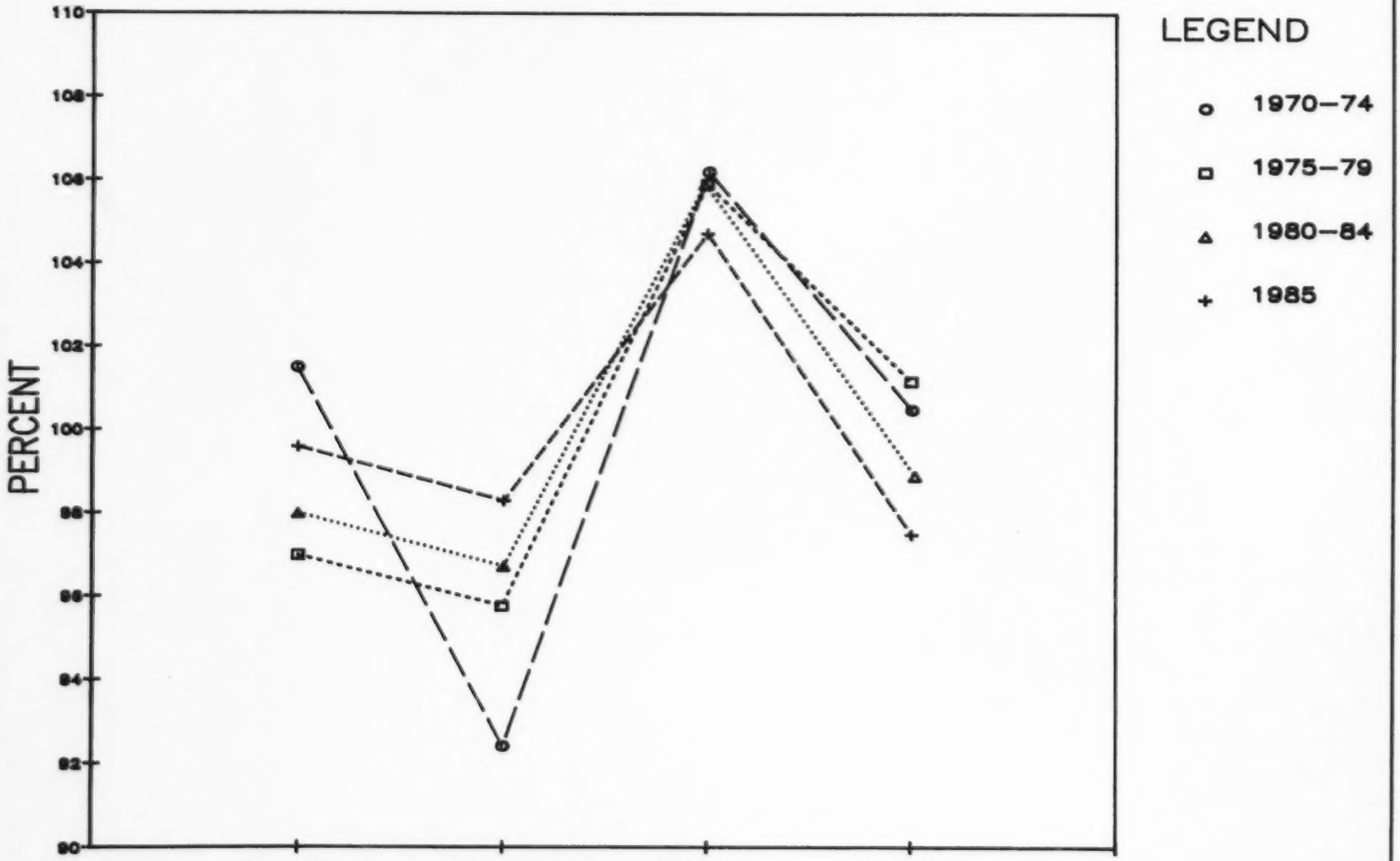
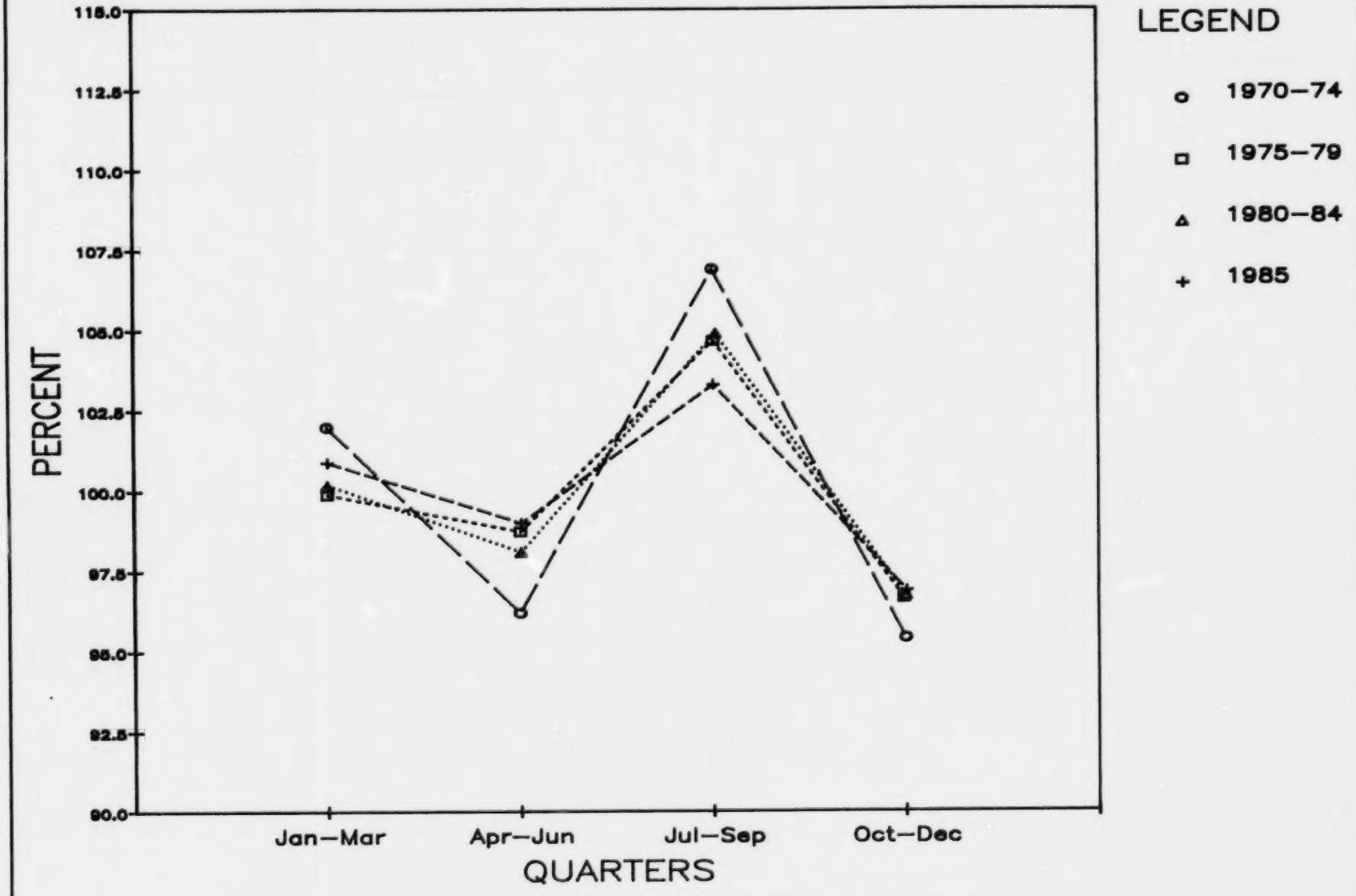
5 As much pork is consumed in the processed as in the fresh form. The sustained consumption of processed pork tends to dampen seasonal demand for fresh cuts especially in summer resulting in an even distribution.

FIGURE 10. SEASONALITY IN CANADIAN HOG PRICES*



*Ontario Hog Prices were used

FIGURE 11. SEASONALITY IN US HOG PRICES*



*Hog Prices at US Seven Markets were used

seasonal low during 1970 to 1984. While the Canadian prices are at their seasonal low in the second quarter, the American lows occur in the fourth quarter. In 1985 both series reflected seasonal lows in the last quarter.

The seasonal span of variation has been relatively smaller for American prices. The spans have declined over the years from 11.5% to 8.1%, then to 8.2% and 6.4%, in 1970-74, 1975-79, 1980-84 and 1985 respectively.

4.1 Hog Marketings

The general seasonal pattern in the Canadian hog marketings over the 16 years, 1970 to 1985, is shown in Figure 12. Within the 1970-74 period, hog marketings reflect above seasonal average values in the first and second quarters. A seasonal peak of 103.8% was experienced in the second quarter. But the seasonal peak changed during 1975-79 to the first quarter and remained in this quarter until 1985. Seasonal high marketings averaged 4 percentage points above the seasonal average over the 16 years examined. The seasonal low marketings for the years studied, all average 5% less than the seasonal average and it occurred consistently in the third quarter.

There was a decline in the degree of variability in the marketings over the complete time period. During 1970-74 the variability was recorded at 9.2%; it dropped to 7.8% during 1975-79 then rose to 8.0% in 1980-84 before declining to 7.5% in 1985. The decline in the span of seasonal variation in marketings is a reflection of an increase in the uniformity in hog marketings within the year as related to improved buildings and equipment of a continuous type of farrow to finish, weanling or finishing operation of the Canadian swine enterprises.

The seasonal pattern of hog marketings for the United States illustrated in Figure 13 indicates that, over the complete time period, the seasonally lightest marketings occurred in the third quarter while the seasonal peak was experienced in the last quarter. The timing of the seasonal highs and troughs is consistent in all the five-year periods studied. Above seasonal average marketings was evident over the first and last quarters during the 1970s; however, this occurrence is observed only in the last quarter during the 1980s.

FIGURE 12. SEASONALITY IN CANADIAN HOG MARKETINGS

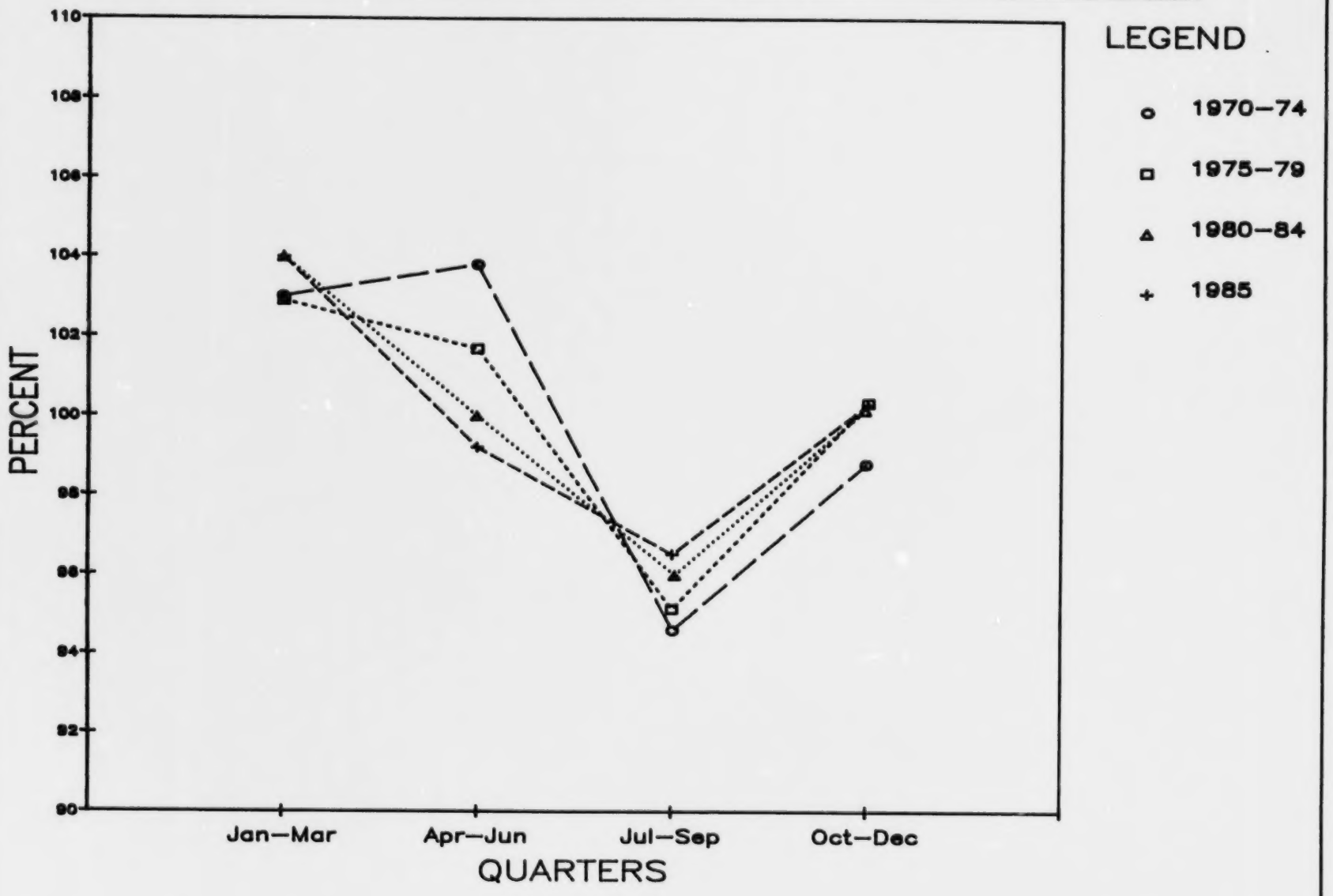
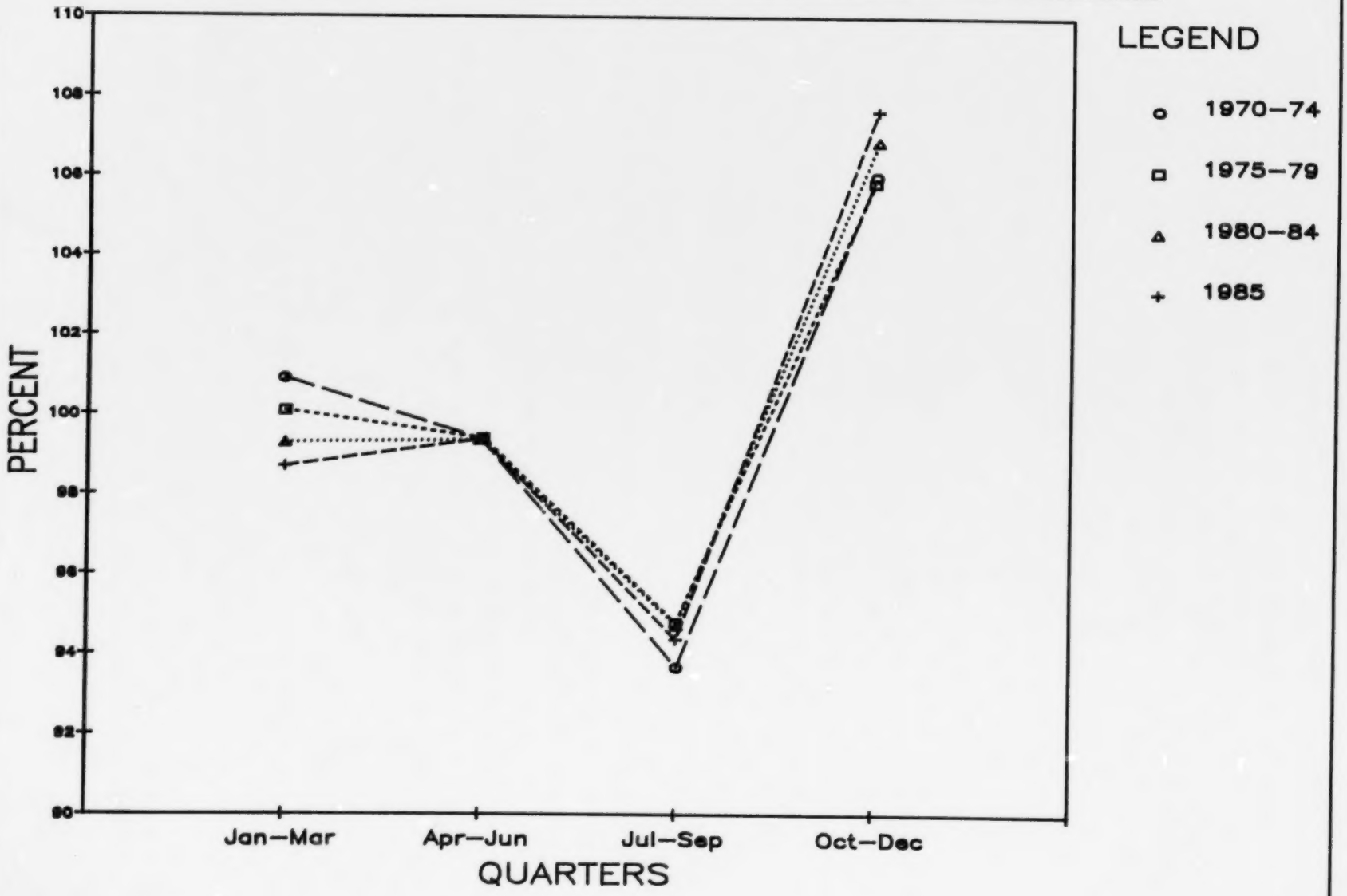


FIGURE 13. SEASONALITY IN U.S. HOG MARKETINGS



In terms of seasonal variation, the span has remained fairly stable, fluctuating between 11% and 13%. During the period, 1970-74, the seasonal span was 12.3%; it declined to 11% in 1975-79; and increased to 12.1% and 13.2% in 1980-84 and 1985 respectively. The seasonal span of marketing movements in the United States appears more pronounced than that in Canada. This may be due to the fact that an important proportion of the US swine production does not take place under full confinement in buildings.

4.2 General Observations

The seasonal pattern of hog marketings was found to be converse to the price pattern as shown in Figure 14. Seasonal low prices were found to coincide with seasonal high marketings. These patterns for both prices and marketings are directly related to the process of hog production. Sow farrowings are high during the summer months, and consequently high marketings occur during the first quarter (i.e. about six months later). Likewise, in the winter months fewer sows farrow and coupled with a relatively greater mortality rate, marketings in the third quarter (i.e six monhs later) are the lowest. The fact that the hog industry is moving towards larger farming units for a more continuous poduction is reflected in the increased consistency in the variability in marketings over the years studied.

The Canadian hog industry demonstrates a lower degree of seasonality in both prices and marketings than that of the United States. This could be a reflection of the differences in climatic conditions hence, the different building requirements between the two countries which result in a more continuous production system in Canada.

5.0 LAMB PRICES

Prices of lamb generally decline in the fall and advance in the winter, especially during the Christmas period. The seasonality patterns of lamb prices charted in Figure 15 reflect a consistency in terms of the seasonal peaks and troughs in all the five-year periods from 1970 to 1985. Lamb prices are observed to be above the seasonal average in the first two quarters.

FIGURE 14. SEASONALITY IN CANADIAN HOG PRICES AND MARKETINGS, 1980–85

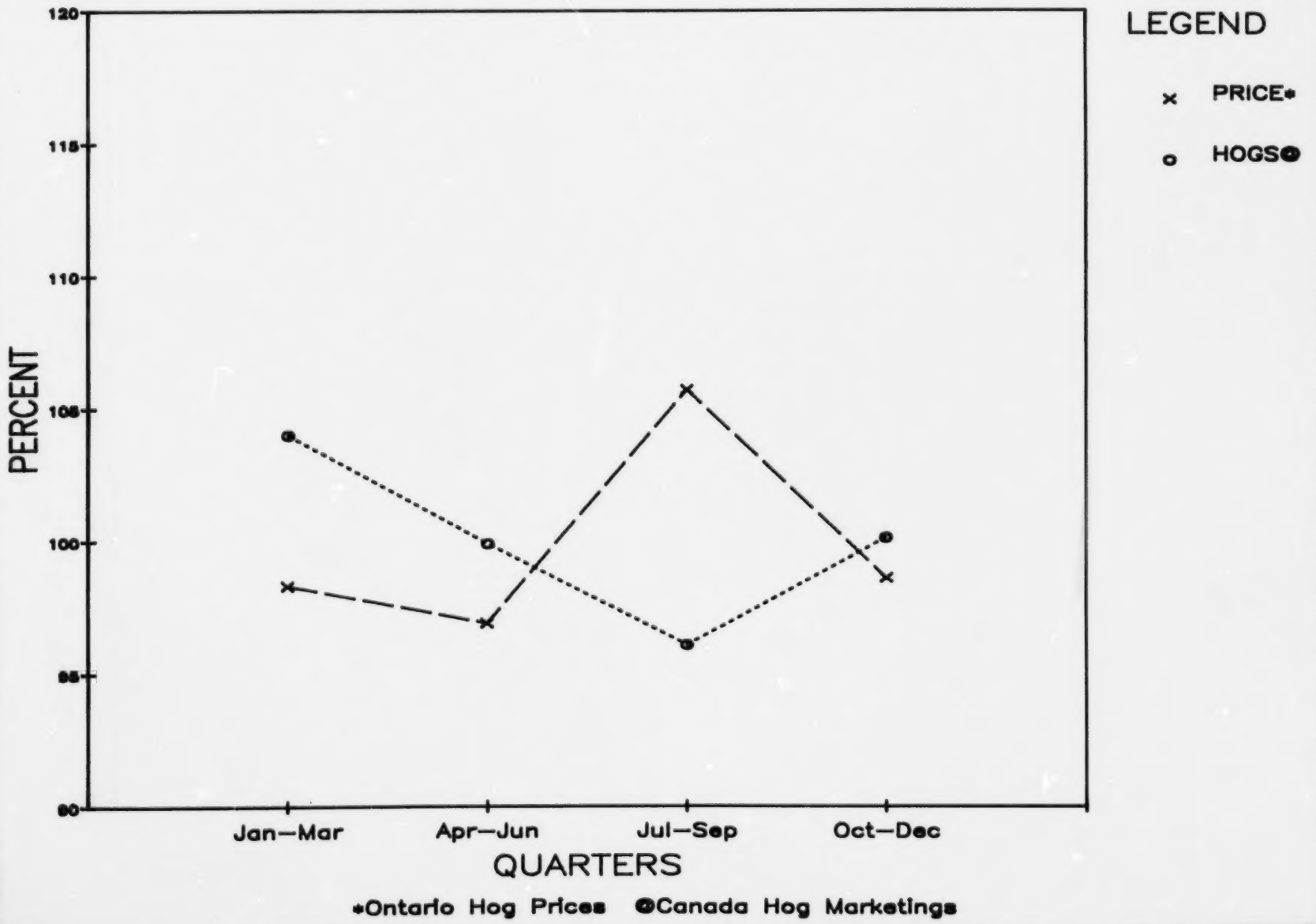
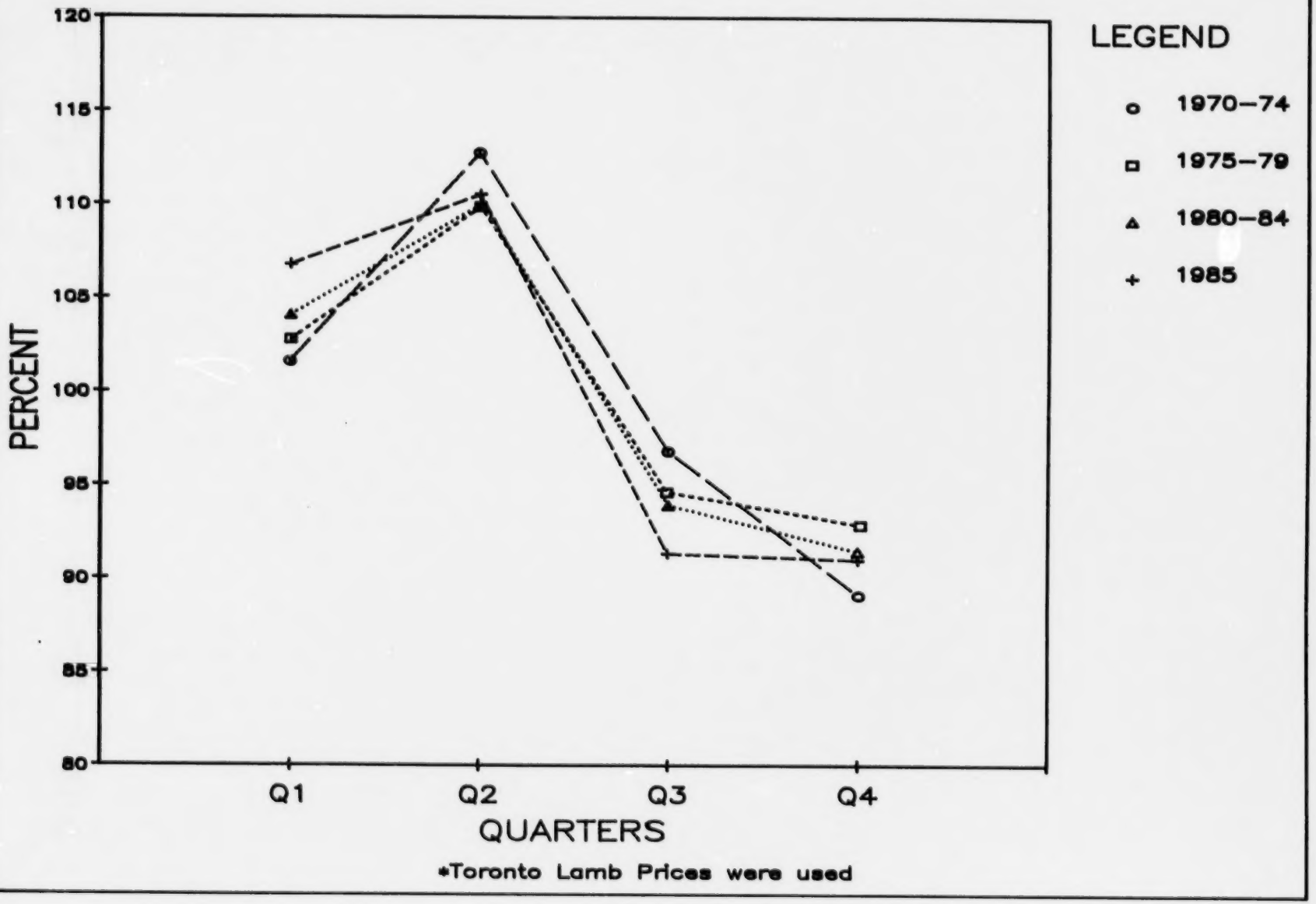


FIGURE 15. SEASONALITY IN CANADIAN LAMB PRICES*



*Toronto Lamb Prices were used

Depending on whether Easter falls in late March or early April, the seasonal peak can occur in the first or second quarter.[6] Over the complete time period the seasonal peak was experienced in the second quarter and thereafter, prices decline. Prices are below the seasonal average beginning the third quarter and decline to a seasonal low in the fourth quarter.

The high seasonal factors average 10 points above while the lows average 8 points below the seasonal average. These values reflect a high degree of seasonal variation, however, a decline has been noted over the years. The seasonal span in 1970-74 at 23.4% dropped to 16.4% in 1975-79 and move up to around the 18% level in the 1980s.

5.1 Lamb Marketings

Lamb marketings in this report refers to the total number of commercial lamb slaughter. Two distinct classifications of lamb marketings are identified, spring and fed lambs. Spring lambs are marketed without being weaned. These are milk-fat lambs which could also be creep fed. These animals are marketed in the late spring and the number marketed increases into the summer months. Fed lambs are weaned and grain fed in feedlots. These animals enter the market in greatest volume during the winter months. The seasonal characteristics of lamb marketing are illustrated in Figure 16. It can be observed that extreme variations in lamb marketings have declined over the years. The seasonal span has fallen from 58% during 1970-74 to 34.7% in 1985 reflecting a 40% improvement in the seasonal marketing variation. Marketings above the seasonal average in the last two quarters reached a seasonal peak in the fourth quarter at an average of 23% above the seasonal average for years 1970 to 1984. In 1985, the seasonal peak occurred in the third quarter. Marketings were considerably below the seasonal average in the second quarter. In 1985 the seasonal low marketings were about 28% less than the

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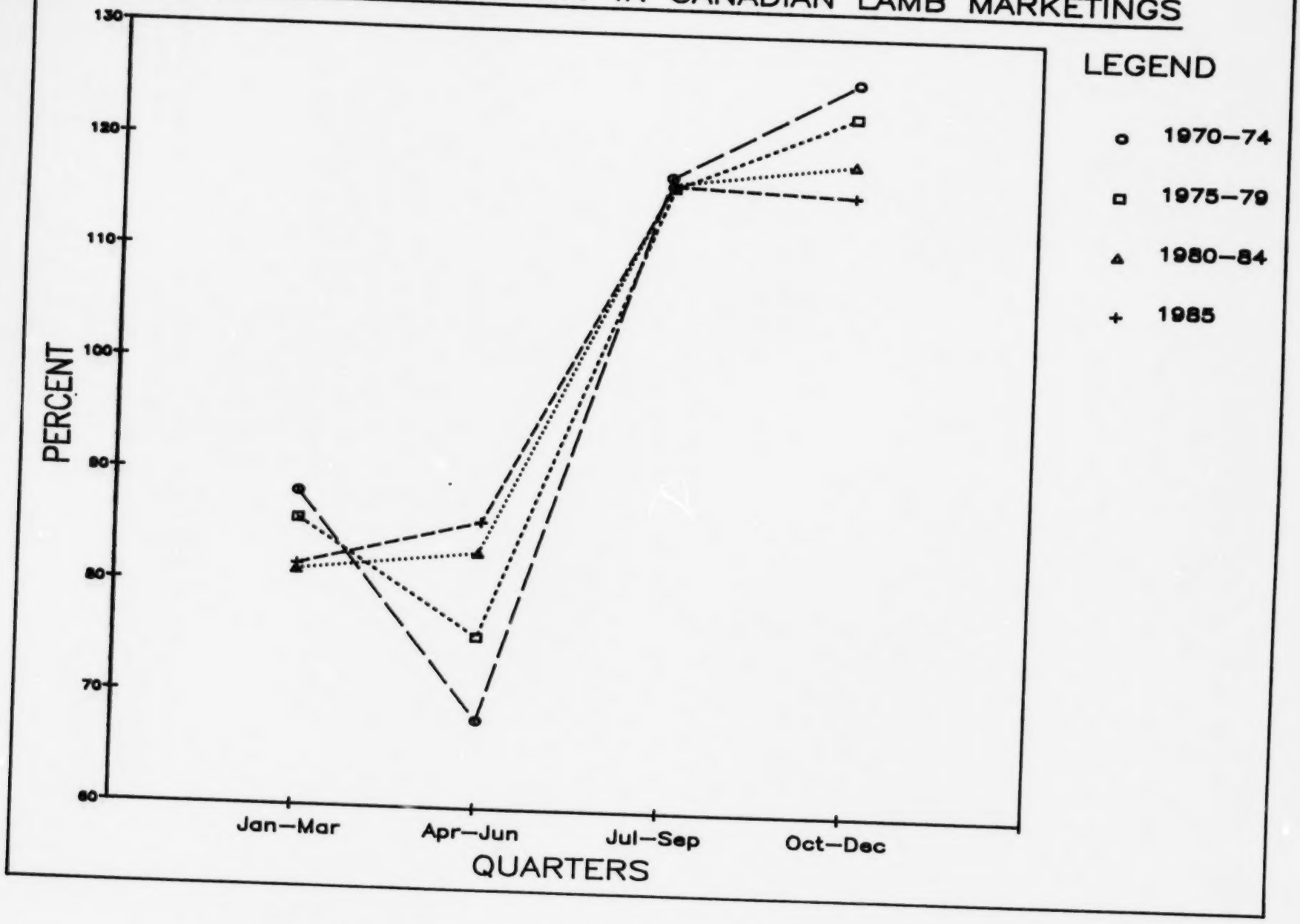
6 It must be noted that the lamb year runs from December to November, hence, lamb prices are at the seasonal peak in the second quarter of the lamb year i.e. during the easter period.

FIGURE 16. SEASONALITY IN CANADIAN LAMB MARKETINGS



seasonal average between 1970 and 1979. In the 1980s, the seasonal low experienced in the first quarter was about 19% below the seasonal average.

Seasonal variation has declined over the years. The seasonal span recorded was 58% in 1970-74 and declined by almost half to 34.7% in 1985. Nevertheless, lamb marketings is still highly seasonal which reflects the seasonal characteristic of lamb consumption.[7]

6.0 CHICKEN PRICES

The price seasonality of chickens has been fairly stable all year round. The seasonal variability was less than 3% over the years studied. During 1970-74 the seasonal span was 2.9%, it decreased to 1.7% in 1980-84 before rising to 2.8% in 1985. Chicken prices have been less than the seasonal average in the first and last quarters and peak in the third quarter during the 1970s. During the 1980's the seasonal factor for chicken prices was below the seasonal average in the first two quarters and reached a seasonal peak in the third quarter before levelling off in the fourth quarter. The seasonality in the Canadian price pattern changed in the 1980s as illustrated in Figure 17.

6.1 Chicken Marketings

Figure 18 represents the seasonal patterns of chicken marketings. The seasonality of chicken marketings has changed somewhat over the years. During the period, 1970-74, chicken marketings peaked in the third quarter, but since then the peak season shifted to the second quarter. Seasonal marketings varied over a range of less than 12% from the peak level to the low point over the 16 years during 1970 to 1985. Below seasonal average marketings occurred in the first quarter and increased to a seasonal high in the second quarter which was 5% above the seasonal average. Marketings declined seasonally in

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7 Lamb consumption is greatly influenced by both seasonal and socioeconomic factors. Lamb demand is heavy at Easter and Christmas. Also higher income groups tend to consume more lamb.

FIGURE 17. SEASONALITY IN CANADIAN CHICKEN PRICES

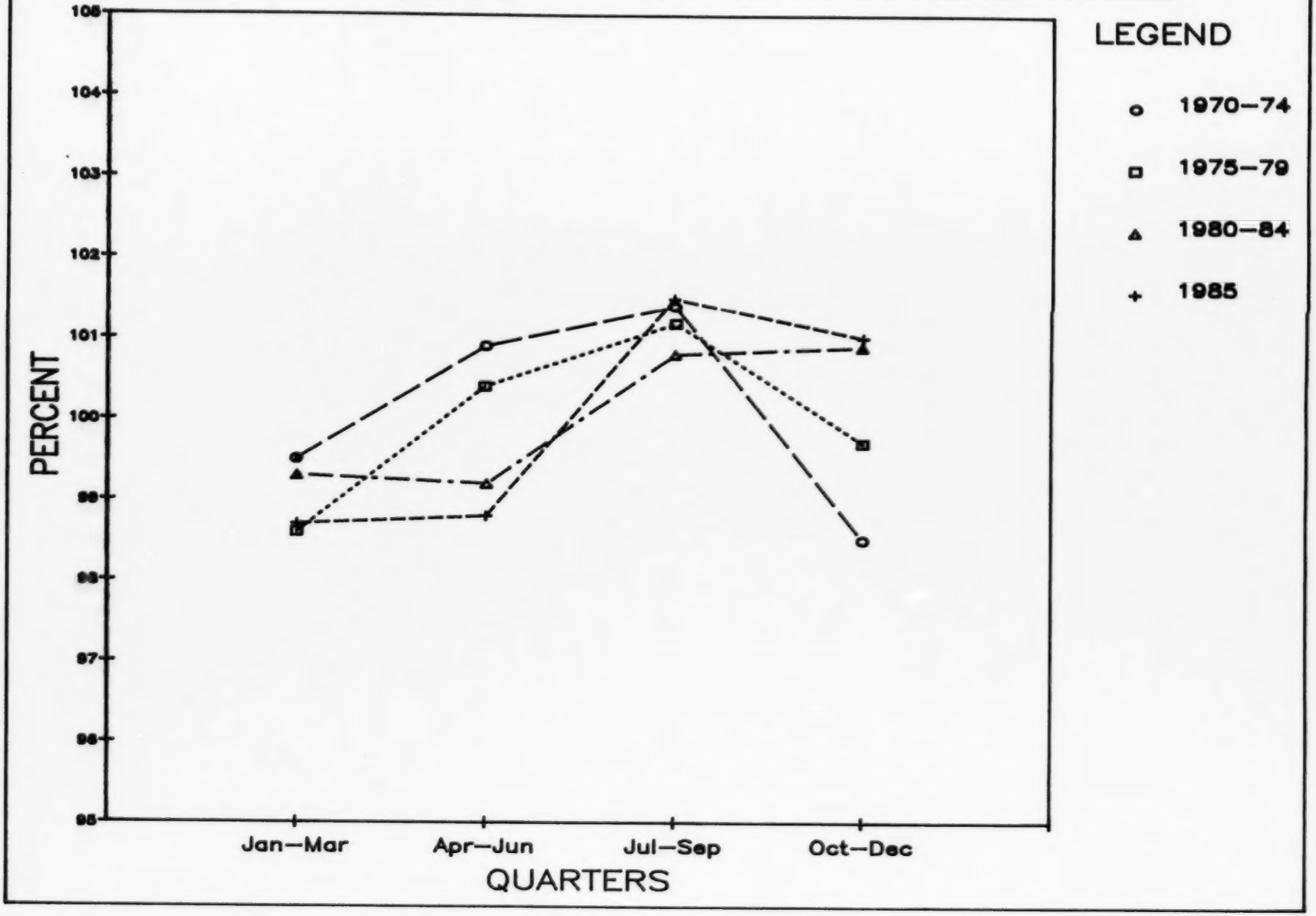
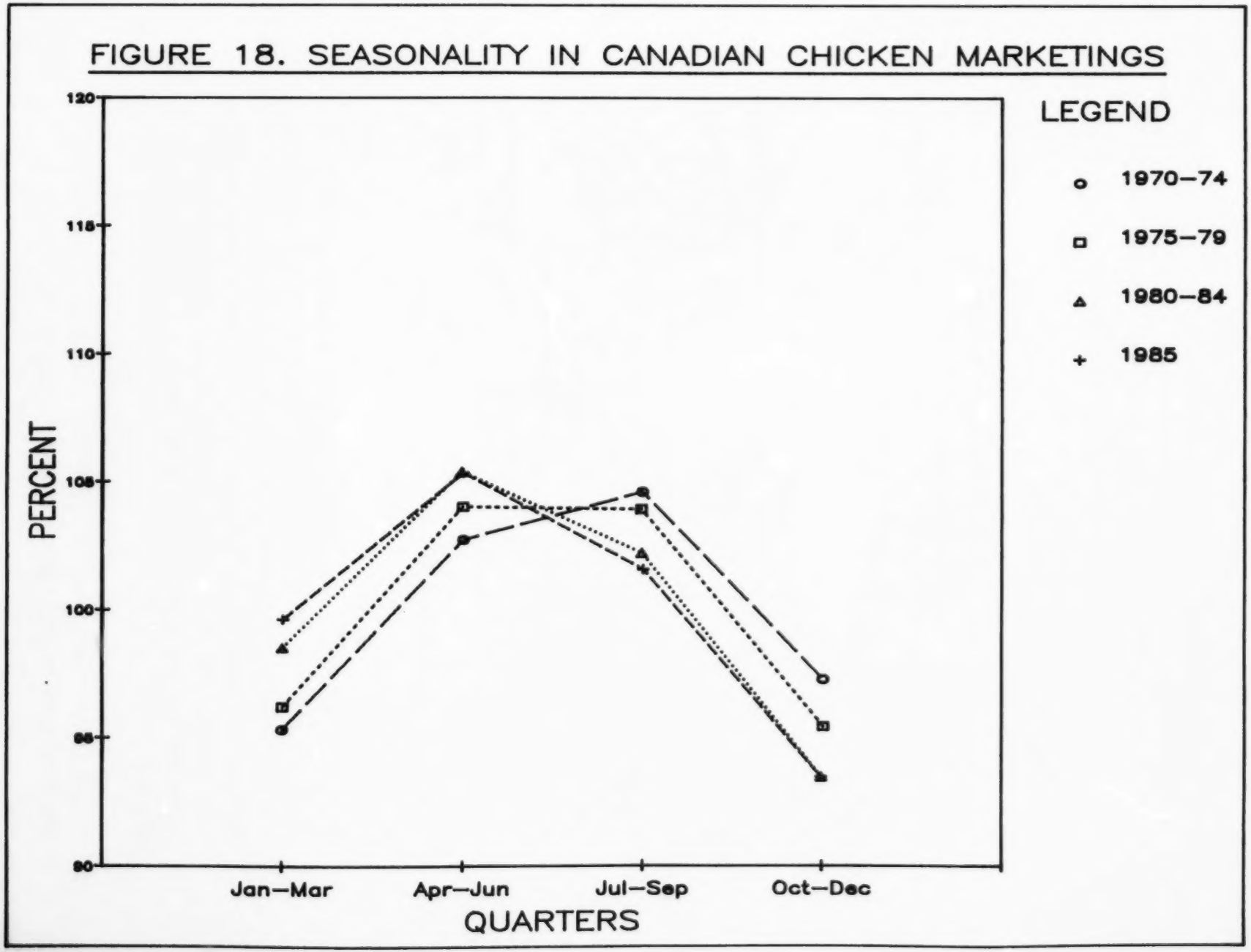


FIGURE 18. SEASONALITY IN CANADIAN CHICKEN MARKETINGS



the third quarter and also to a seasonal minimum in the last quarter at 95% of the seasonal average. The occurrence of the seasonal trough changes from the first quarter during 1970-74 to the last quarter in 1975-79 and has remained consistently in the fourth quarter since that time.

7.0 SUMMARY AND CONCLUSIONS

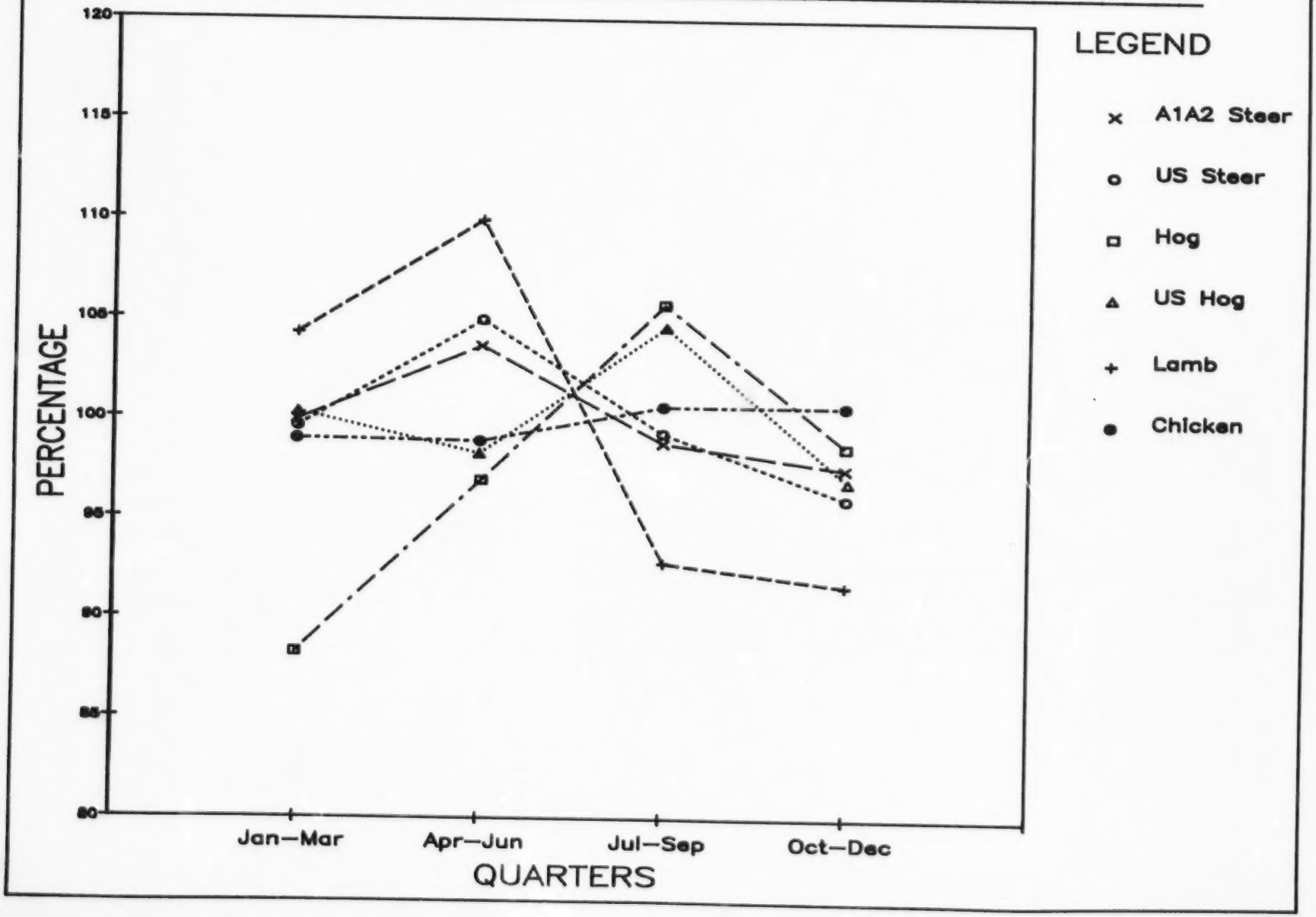
This paper contains observations of the seasonality patterns in both prices and marketings of the livestock industry. It represents a descriptive analysis of mainly the Canadian data. A comparison with the US data for both cattle and hog was also done. From this analysis several findings concerning seasonality can be identified:

1. Livestock prices (cattle, hogs, lambs and chickens) display seasonal patterns that are the approximate inverses of their respective marketing patterns. The livestock price seasonality patterns in 1980-85 are illustrated in Figure 19. Seasonal price movements of both cattle and lamb are very similar. This phenomenon is related to the fact that seasonal production of cattle and lamb is pasture related and both share similar production and marketing patterns. Generally, heavy marketings and less than seasonal average prices occur during the later half of the year while seasonally high prices accompany below seasonal average marketings in the first half of the year. Specifically, seasonal cattle price peak occurs in the second quarter and the seasonal low in the fourth quarter in both Canada and the United States. In the case of lambs, a second quarter seasonal peak and a last quarter trough in the prices can be observed.

2. In the case of hogs, since production patterns are very different, the seasonally high and low price periods do not coincide with those for cattle and lambs. Hog prices in both Canada and the United States are at their seasonal peak in the third quarter, when seasonal marketings are at their minimum. While hog prices in Canada are at a seasonal low in the second quarter, hog prices in the United States are at theirs in the last quarter.

3. Chicken prices display very little or no seasonality. Prices oscillate very little around the seasonal average throughout the year.

FIGURE 19. SEASONALITY IN LIVESTOCK PRICES, 1980–85



4. Arranged in the order of declining variability, the 1980-85 seasonal price span for lambs, choice steers in the United States, index 100 hogs, hogs in the United States, A1A2 steers and chickens are 18.3%, 8.9%, 8.8%, 7.8%, 6.1%, and 1.8% respectively. Lamb prices, as expected, are the least stable; they reflect the high seasonal variability of lamb marketings. The seasonal span for cattle prices is more pronounced than that for hogs even though the reverse is true for the marketings.

5. Seasonal variations of livestock marketings in Canada are a reflection of the influences of weather on the production process. Most of the nation's crop of pigs, calves and lambs are born during the second quarter (spring) to avoid the harsh winter climate in the first quarter and in the case of cattle and sheep, to utilize the summer pasture in the third quarter. This leads to a buildup of livestock at predictable intervals.

6. Seasonality in cattle marketings has stabilized considerably over the last 16 years. Much of this has been brought about through the growth and development of feedlotting and thus a quicker inventory turn-over of cattle being fed for the market. The fattening of cattle through grain finishing which hastens the time these animals get to the market, is therefore closely associated with the weather patterns.

7. While the seasonal patterns of cattle marketings for Canada and the United States are similar in several respects, there are also some differences. Seasonally lowest marketings occur in the first quarter in both countries; however, the primary seasonal marketing peak is recorded in the third quarter in the United States and in the last quarter in Canada. In addition, above seasonal average marketings are evident over the third and fourth quarters in the United States while in Canada they occur over three quarters from the second to the fourth. At 4.5%, the seasonal span of movements in marketings in the Unites States is higher than that in Canada which is recorded at 3.1%.

8. The Canadian hog production is very closely related to the weather conditions. In the winter months sow farrowing is at the minimum and in the summer months it is at the greatest. This has resulted in seasonal patterns that reflect heaviest hog marketings during the first quarter and

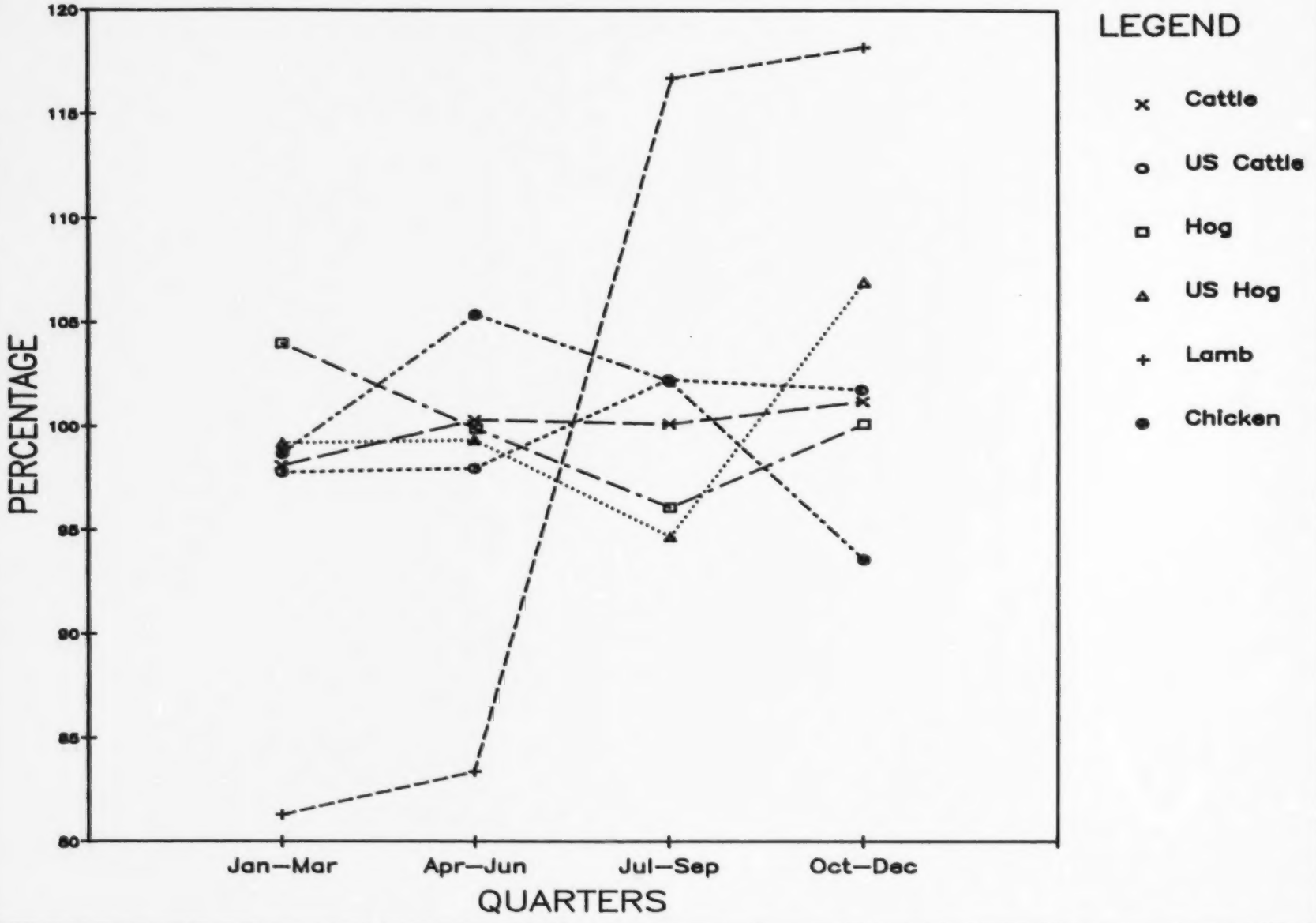
lightest in the third quarter. In the United States, seasonality in hog marketing follows a pattern that reflects minimum marketings in the third quarter and heaviest in the last. This is indicative of a typically spring farrowing pattern. Also, hog marketings in the United States is more variable seasonally than in Canada. The seasonal span at 12.3% for the United States is twice as great as that for Canada.

9. Market lambs are produced essentially in two ways; they either are raised from birth to market weight on the same farm or raised from birth to a weight of about 27 kilograms (60 pounds), then sold as feeder lambs and finished in a feedlot. These finished lambs are then marketed off pastures or from dry lots chiefly from July to December (third and fourth quarters).

10. Above seasonal average chicken marketings occur during the second and third quarters while less than seasonal average marketings are observed during the first and last quarters. On the whole chicken marketings are relatively consistent throughout the year.

11. Differences in the seasonal variabiltiy of marketings of cattle, hogs, lambs and chickens may be demonstrated by comparing the individual seasonal spans. In terms of increasing seasonal variability, the seasonal span of Canadian cattle marketings at 3.1% is the least variable followed by cattle marketings in the United States at 4.5%; the respective seasonal spans of Canadian hog marketings, hog marketings in the United States, chicken marketings and lamb marketings are 7.9%, 12.3%, 11.8% and 36.9%. Hog marketings in the United States are twice as variable as those in Canada and wide seasonal swings characterized lamb marketings. (Figure 20 charts the seasonality in livestock marketings during 1980-85.)

FIGURE 20. SEASONALITY IN LIVESTOCK MARKETINGS, 1980–85



REFERENCES

1. Agriculture Canada, Livestock Market Review

2. Breimyer, H.F. and C.A. Kause, Charting the Seasonal Market for Meat Animals, USDA Handbook 83, June 1955

3. Darcovich, W., and R. Berthiaume, Seasonal Variation in the Livestock Industry: Cattle, Sheep, Hogs, and Calves. Agriculture Canada Publication 1117, 1961

4. Marshall, R.G., Seasonal Variation In the Prices and Marketing of Livestock and Poultry Products 1947-1957

5. Larsen, J.T., Seasonality of the Cattle Market, USDA, ERS-468

6. Petrie, T.M. and A.G. Wilson, Seasonal, Cyclical and Trend Variations in Hog Prices and Numbers Slaughtered, Agriculture Canada Discussion Paper, July 1974

7. Petrie, T.M., Seasonal, Cyclical and Trend Variations in the Hog Industry, Agriculture Canada, November 1974

8. Pugh G., The Economics of Feeder Cattle and Calf Pricing in North America, Canadian Farm Economics, Vol. 20 No. 1, 1986.

9. West, D.A. and H.W. Smith, Instability in the Hog-Pork Industry, Canadian Farm Economics, Vol. 8, No. 2, April 1973

10. Zafiriou, M., Current Concerns - Changing Meat Consumption Patterns in Canada, Agriculture canada food Market Commentary, December 1985

APPENDIX I

TABLE 1. LIVESTOCK PRICES-SEASONAL FACTORS

VARIABLE	1980 - 85 QTR 1	QTR 2	QTR 3	QTR 4	1986 QTR 1	QTR 2	QTR 3	QTR 4
A1A2 S. STEER	99.9	103.6	98.8	97.5	100.8	104.2	97.2	97.9
U.S. CHOICE STEER	99.6	104.9	99.3	96.0	101.2	103.9	98.2	96.8
INDEX 100 HOG	98.3	96.9	105.7	98.6	99.8	98.4	104.4	97.6
U.S. HOG	100.3	98.2	104.6	96.8	101.1	99.0	103.0	97.1
LAMB	104.5	110.2	93.0	91.9	106.9	110.6	90.3	92.3
CHICKEN	99.2	99.1	100.9	100.9	98.6	98.8	101.6	101.0

TABLE 2. LIVESTOCK MARKETINGS-SEASONAL FACTORS

VARIABLE	1980 - 85 QTR 1	QTR 2	QTR 3	QTR 4	1986 QTR 1	QTR 2	QTR 3	QTR 4
TOTCAT CDN	98.1	100.3	100.1	101.2	99.1	100.5	100.3	100.0
TOTCAT U.S.	97.8	98.0	102.3	101.8	97.1	99.1	103.0	100.1
CDN. HOG	104.0	99.9	96.1	100.1	104.0	99.2	96.6	100.2
U.S. HOG	99.2	99.4	94.6	106.9	98.7	99.4	94.4	107.6
LAMB	81.3	83.4	116.7	118.2	81.9	86.0	116.4	115.5
CHICKEN	98.7	105.4	102.	293.6	99.7	105.3	101.6	93.6

APPENDIX II

TABLE 1. SEASONAL FACTORS OF AVERAGE QUARTERLY PRICES OF SLAUGHTER STEERS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	101.8	101.4	99.8	97.2
1971	101.8	100.8	100.2	97.6
1972	101.4	100.1	100.9	98.5
1973	100.3	99.7	101.3	99.6
1974	99.1	99.6	101.6	100.5
1975	97.7	100.4	101.2	100.9
1976	97.0	101.5	100.4	100.8
1977	97.0	102.6	99.5	100.1
1978	97.9	103.0	99.3	99.2
1979	98.6	103.1	99.5	98.3
1980	99.2	103.1	99.7	97.7
1981	99.4	103.3	99.7	97.3
1982	99.8	103.4	99.3	97.3
1983	100.0	103.8	98.7	97.3
1984	100.3	104.1	97.9	97.5
1985	100.7	104.1	97.5	97.8

Stability Seasonality Test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	90.485	3	30.162	2.752
Residual	657.654	60	10.961	
Total	748.138	63		

No evidence of stable seasonality at the 1 percent level

TABLE 2. SEASONAL FACTORS OF US AVERAGE QUARTERLY PRICES OF CHOICE STEERS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	102.1	102.8	101.8	93.3
1971	102.2	102.3	102.4	93.4
1972	101.7	102.1	103.0	93.9
1973	100.4	102.3	103.4	94.9
1974	98.6	103.0	103.2	96.0
1975	97.2	103.9	102.6	96.8
1976	96.3	105.1	101.2	97.5
1977	96.1	105.9	100.0	97.6
1978	96.7	106.2	99.6	97.0
1979	97.5	105.9	99.9	96.2
1980	98.0	105.9	100.0	95.8
1981	98.5	105.8	100.0	95.6
1982	99.2	105.2	99.7	95.7
1983	100.0	104.6	99.2	96.0
1984	100.7	104.2	98.6	94.4
1985	101.2	103.9	98.2	96.8

Stability Seasonality Test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	425.262	3	141.754	8.608**
Residual	988.00	60	16.467	
Total	1413.270	63		

** Presence of stable seasonality at the 1 percent level

TABLE 3. SEASONAL FACTORS OF AVERAGE QUARTERLY PRICES OF FEEDER STEERS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	98.1	96.7	103.1	102.1
1971	97.9	97.5	102.2	102.3
1972	97.7	99.0	100.3	102.8
1973	97.4	101.2	97.8	103.1
1974	97.5	103.1	95.7	103.1
1975	97.8	104.6	94.3	102.7
1976	98.6	104.7	94.1	102.0
1977	99.5	104.0	94.7	101.4
1978	100.5	102.6	96.0	101.1
1979	100.7	101.6	96.9	101.0
1980	100.7	101.1	97.3	101.0
1981	100.7	101.0	97.2	101.2
1982	100.6	101.1	97.0	101.3
1983	100.5	101.3	96.9	101.2
1984	100.7	101.4	96.9	101.0
1985	101.0	101.3	96.7	101.1

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	169.830	3	56.610	3.085
Residual	1100.920	60	18.349	
Total	1270.750	63		

No evidence of stable seasonality at the 1 percent level

TABLE 4. SEASONAL FACTORS OF AVERAGE QUARTERLY PRICES OF SLAUGHTER COWS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	100.5	104.1	101.5	93.9
1971	100.4	104.3	101.6	93.6
1972	100.3	104.8	101.6	93.0
1973	100.2	105.7	101.6	92.1
1974	100.3	106.71	101.4	91.2
1975	100.3	107.8	100.8	90.6
1976	100.8	108.4	99.9	90.8
1977	101.5	108.0	99.2	91.6
1978	102.1	106.6	99.2	92.8
1979	102.1	104.9	100.1	93.6
1980	100.7	103.7	101.3	94.0
1981	100.9	103.1	102.7	93.6
1982	100.2	103.2	103.6	93.0
1983	99.5	104.0	104.0	92.2
1984	99.4	104.8	103.8	91.8
1985	99.4	105.3	103.5	91.7

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	1508.330	3	502.777	48.361**
Residual	623.779	60	10.396	
Total	2132.110	63		

** Presence of stable seasonality at the 1 percent level

TABLE 5. SEASONAL FACTORS OF AVERAGE QUARTERLY MARKETINGS OF SLAUGHTER STEERS AND HEIFERS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	95.8	102.5	107.9	93.6
1971	96.0	102.8	107.4	93.3
1972	96.6	103.4	106.6	92.8
1973	97.6	103.6	105.5	92.7
1974	98.8	103.5	104.5	92.8
1975	99.9	103.0	103.7	93.4
1976	100.3	102.5	103.3	94.2
1977	100.1	102.3	103.1	95.2
1978	99.1	102.5	103.2	95.7
1979	98.1	102.9	103.4	95.9
1980	97.3	103.3	103.9	95.8
1981	96.7	103.5	104.5	95.4
1982	96.4	103.6	105.1	94.8
1983	96.4	103.5	105.6	94.4
1984	96.5	103.4	105.9	94.2
1985	96.4	103.3	106.2	94.0

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	1246.800	3	415.598	43.567**
Residual	572.357	60	9.539	
Total	1819.150	63		

** Presence of stable seasonality at the 1 percent level

TABLE 6. SEASONAL FACTORS OF US AVERAGE QUARTERLY MARKETINGS OF STEERS, HEIFERS, COWS & BULLS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	97.9	99.5	101.2	101.4
1971	98.1	99.3	100.9	101.7
1972	98.4	98.9	100.7	102.1
1973	98.8	98.3	100.5	102.5
1974	99.2	97.5	100.6	102.8
1975	99.6	97.0	100.6	102.9
1976	99.7	96.6	100.8	102.9
1977	99.7	96.6	100.9	102.9
1978	99.6	96.7	101.0	102.9
1979	99.3	96.9	101.0	103.0
1980	98.9	97.0	101.3	102.9
1981	98.4	97.3	101.8	102.6
1982	97.9	97.7	102.3	102.0
1983	97.5	98.3	102.6	101.5
1984	97.3	98.7	102.9	101.0
1985	97.2	98.9	103.0	100.8

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	189.819	3	63.273	13.868**
Residual	273.743	60	4.562	
Total	463.562	63		

** Presence of stable seasonality at the 1 percent level

TABLE 7. SEASONAL FACTORS OF AVERAGE QUARTERLY MARKETINGS OF COWS AND BULLS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	98.0	90.5	100.0	111.2
1971	98.9	89.4	99.4	112.9
1972	99.8	87.2	98.2	116.2
1973	100.2	84.8	96.1	120.4
1974	100.4	82.6	93.8	124.6
1975	100.3	81.5	91.0	128.1
1976	99.9	81.7	88.7	130.0
1977	99.4	83.3	86.7	130.2
1978	99.1	85.3	85.8	128.7
1979	99.3	87.4	85.4	126.7
1980	99.7	89.2	85.5	124.0
1981	100.7	90.7	85.8	120.9
1982	102.4	91.8	85.8	118.2
1983	104.3	92.5	85.5	116.3
1984	105.8	92.9	85.1	115.3
1985	106.7	93.2	84.9	114.8

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Qaurters	11889.200	3	3963.060	60.935**
Residual	3902.280	60	65.038	
Total	15791.500	63		

** Presence of stable seasonality at the 1 percent level

TABLE 8. SEASONAL FACTORS OF AVERAGE QUARTERLY MARKETINGS OF ALL CATTLE

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	96.6	99.8	104.0	99.5
1971	96.7	99.8	103.7	99.7
1972	97.1	99.6	103.0	100.3
1973	97.6	99.2	102.1	101.3
1974	98.2	98.4	101.1	102.5
1975	98.7	97.8	100.1	103.7
1976	98.8	97.3	99.5	104.6
1977	98.5	97.5	99.1	105.0
1978	98.0	98.1	99.1	104.8
1979	97.5	98.9	99.3	104.1
1980	97.2	99.6	99.7	103.1
1981	97.3	100.1	100.0	102.1
1982	97.7	100.4	100.3	101.1
1983	98.3	100.4	100.3	100.5
1984	98.8	100.5	100.3	100.3
1985	99.0	100.5	100.3	100.1

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between quarters	194.364	3	66.121	7.416**
Residual	534.973	60	8.916	
Total	733.337	63		

** Presence of stable seasonality at the 1 percent level

TABLE 9. SEASONAL FACTORS OF AVERAGE QUARTERLY PRICES OF INDEX 100 HOGS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	103.2	93.0	104.6	99.5
1971	102.9	92.6	104.1	100.1
1972	102.0	92.0	106.1	100.7
1973	100.6	91.8	107.2	101.0
1974	99.0	92.5	108.0	101.0
1975	97.5	93.9	107.8	100.8
1976	96.7	95.6	106.7	100.9
1977	96.7	96.6	105.4	101.2
1978	97.0	96.5	104.9	101.6
1979	97.2	96.1	105.0	101.7
1980	97.4	95.7	105.6	101.1
1981	97.5	95.8	106.3	99.9
1982	97.8	96.4	106.6	98.5
1983	98.3	97.4	106.1	97.5
1984	99.0	98.1	105.2	97.3
1985	99.6	98.3	104.7	97.5

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	805.817	3	268.605	17.841**
Residual	903.320	60	15.055	
Total	1709.140	63		

** Presence of stable seasonality at the 1 percent level

TABLE 10. SEASONAL FACTORS OF US AVERAGE QUARTERLY HOG PRICES

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	103.6	96.9	105.9	93.9
1971	103.4	96.3	106.3	94.6
1972	102.6	96.8	107.0	95.7
1973	101.0	95.8	107.5	96.4
1974	99.6	96.3	107.9	96.3
1975	98.9	97.6	107.1	96.1
1976	99.1	98.8	105.6	96.0
1977	99.8	99.6	103.9	96.4
1978	100.7	99.1	103.5	96.8
1979	101.0	98.4	103.7	97.4
1980	100.7	97.6	104.6	97.4
1981	100.1	97.5	105.4	97.0
1982	99.8	97.8	105.7	96.4
1983	99.9	98.5	104.9	96.3
1984	100.4	98.9	103.9	96.5
1985	100.9	99.0	103.3	96.9

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	852.966	3	284.322	13.107**
Residual	1301.570	60	21.693	
Total	2154.540	63		

** Presence of stable seasonality at the 1 percent level

TABLE 11. SEASONAL FACTORS OF AVERAGE QUARTERLY MARKETINGS OF HOGS
Year Jan-Mar Apr-Jun Jul-Sep Oct-Dec

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	103.0	104.2	94.8	98.0
1971	103.1	104.0	94.8	98.2
1972	103.1	103.9	94.7	98.6
1973	102.9	103.7	94.5	99.3
1974	102.7	103.3	94.4	100.0
1975	102.6	102.7	94.6	100.5
1976	102.5	102.1	94.8	100.6
1977	102.7	101.6	95.1	100.4
1978	103.1	101.3	95.4	100.1
1979	103.5	101.0	95.6	99.8
1980	103.8	100.7	95.8	99.8
1981	104.0	100.4	95.8	100.0
1982	104.0	100.0	95.9	100.2
1983	104.0	99.7	96.1	100.3
1984	104.0	99.4	96.3	100.3
1985	104.0	99.2	96.5	100.2

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	582.123	3	194.041	54.735**
Residual	212.708	60	3.545	
Total	794.830	63		

** Presence of stable seasonality at the 1 percent level

TABLE 12. SEASONAL FACTORS OF US AVERAGE QUARTERLY MARKETINGS OF HOGS

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	101.0	98.9	93.7	106.4
1971	101.0	99.0	93.7	106.2
1972	100.9	99.4	93.7	105.9
1973	100.8	99.8	93.7	105.7
1974	100.6	99.9	93.8	105.7
1975	100.5	99.8	94.1	105.8
1976	100.3	99.5	94.5	105.8
1977	100.0	99.3	95.0	105.8
1978	99.9	99.2	95.2	105.9
1979	99.7	99.2	95.3	105.8
1980	99.6	99.4	95.1	106.0
1981	99.5	99.5	94.8	106.4
1982	99.3	99.5	94.6	106.9
1983	99.1	99.4	94.4	107.2
1984	98.9	99.4	94.4	107.5
1985	98.7	99.4	94.4	107.5

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	1143.040	3	381.012	32.937**
Residual	171.967	60	2.866	
Total	1315.007	63		

** Presence of stable seasonality at the 1 percent level

TABLE 13. SEASONAL FACTORS OF AVERAGE QUARTERLY PRICES OF LAMB

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	101.8	113.3	96.9	88.1
1971	101.9	112.9	97.1	88.3
1972	101.7	112.6	97.1	88.9
1973	101.6	112.2	96.9	89.5
1974	102.0	111.4	96.4	90.5
1975	102.4	110.6	95.5	91.6
1976	102.9	110.1	94.5	92.7
1977	103.1	109.7	93.9	93.4
1978	103.2	109.3	93.9	93.7
1979	102.9	109.2	94.7	93.2
1980	102.8	109.5	94.8	92.7
1981	102.9	109.8	94.8	91.9
1982	103.8	110.1	93.8	91.5
1983	104.9	110.5	92.6	91.4
1984	106.1	110.7	91.3	91.8
1985	106.6	110.6	90.7	92.1

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	4085.080	3	1361.690	86.070**
Residual	949.249	60	15.821	
Total	5034.330	63		

** Presence of stable seasonality at the 1 percent level

TABLE 14. SEASONAL FACTORS OF AVERAGE QUARTERLY MARKETINGS OF LAMB

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	87.7	64.9	118.8	128.4
1971	87.7	65.8	118.3	127.5
1972	88.0	67.5	117.4	126.0
1973	88.5	69.7	116.2	124.4
1974	88.9	71.9	115.1	123.5
1975	88.5	73.5	115.1	123.0
1976	87.5	74.6	115.5	123.0
1977	86.0	75.4	116.2	123.2
1978	84.3	76.4	116.6	123.4
1979	82.5	77.8	117.1	122.7
1980	81.4	79.6	117.1	121.4
1981	81.0	81.5	116.9	119.9
1982	81.0	83.2	116.6	118.4
1983	81.1	84.6	116.5	117.2
1984	81.3	85.5	116.4	116.2
1985	81.7	85.8	116.4	115.8

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	25131.870	3	8377.280	230.807**
Residual	2177.730	60		
Total	27309.600	63		

** Presence of stable seasonality at the 1 percent level

TABLE 15. SEASONAL FACTORS OF AVERAGE QUARTERLY PRICES OF CHICKEN

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	99.8	101.2	101.2	97.9
1971	99.7	101.1	101.2	98.0
1972	99.6	100.9	101.3	98.4
1973	99.3	100.6	101.3	98.9
1974	99.0	100.4	101.5	99.3
1975	98.6	100.3	101.6	99.6
1976	98.3	100.4	101.6	99.6
1977	98.4	100.6	101.3	99.6
1978	98.6	100.6	100.9	99.8
1979	99.1	100.3	100.5	100.1
1980	99.4	100.0	100.2	100.4
1981	99.5	99.4	100.3	100.8
1982	99.4	99.0	100.7	101.0
1983	99.1	98.7	101.2	101.0
1984	98.8	98.7	101.5	101.0
1985	98.7	98.8	101.5	101.0

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	57.678	3	19.226	6.786**
Residual	169.983	60	2.833	
Total	227.661	63		

** Presence of stable seasonality at the 1 percent level

TABLE 16. SEASONAL FACTORS OF AVERAGE QUARTERLY MARKETINGS OF CHICKEN

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1970	95.2	102.6	104.6	97.6
1971	95.3	102.6	104.5	97.6
1972	95.3	102.7	104.5	97.5
1973	95.3	102.8	104.6	97.2
1974	95.4	103.0	104.6	96.8
1975	95.5	103.3	104.5	96.4
1976	95.8	103.6	104.4	95.9
1977	96.1	104.0	104.0	95.5
1978	96.5	104.4	103.6	95.0
1979	97.0	104.9	103.2	94.5
1980	97.5	105.2	102.9	94.0
1981	98.0	105.6	102.5	93.6
1982	98.6	105.5	102.2	93.4
1983	99.1	105.5	101.9	93.4
1984	99.5	105.3	101.8	93.4
1985	99.6	105.3	101.6	93.5

Stable seasonality test

	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Quarters	867.310	3	289.103	67.546**
Residual	256.805	60	4.280	
Total	1124.110	63		

** Presence of stable seasonality at the 1 percent level

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André Trempe
Services Division
Policy Branch
Sir John Carling Bldg.
Ottawa, Ontario
K1A 0C5
(613) 995-5880